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Project XL: Directory of Regulatory, Policy, and Technology Innovations

2000 Comprehensive Report
Volume 1

Contents

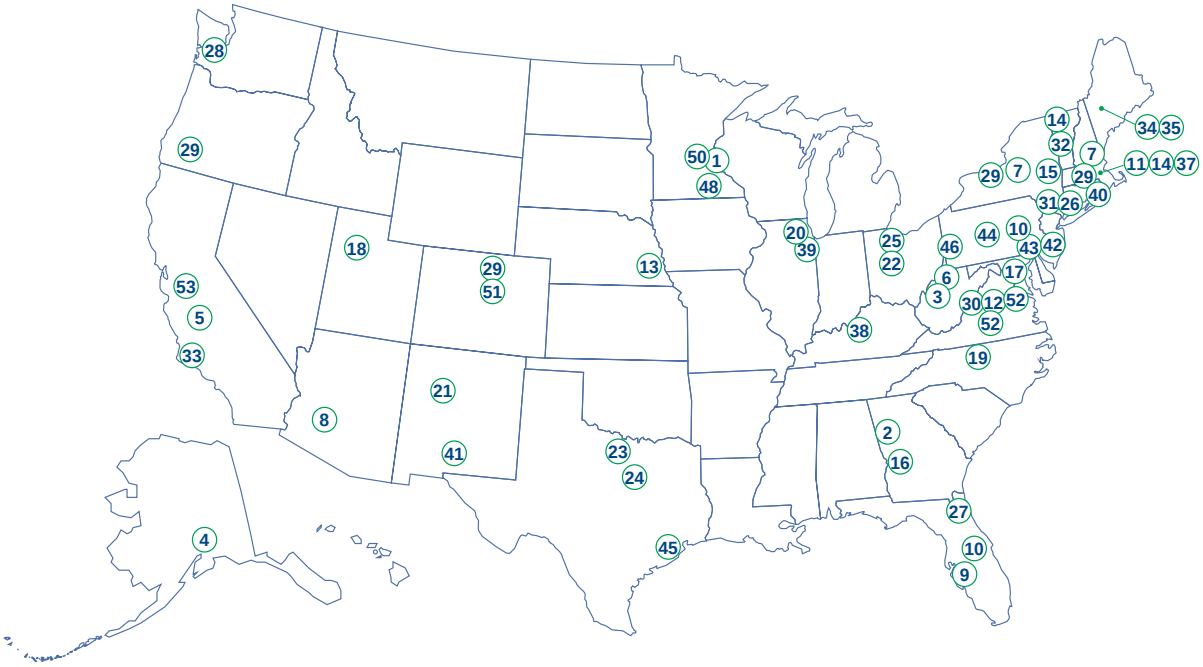
Project XL 2000 Comprehensive Report compiles available information on Project XL. It follows up the work started in the *Project XL 1999 Comprehensive Report* (October 1999).

This report has two volumes. *Volume 1: Directory of Regulatory, Policy, and Technology Innovations* describes more than 70 innovations being explored by Project XL. These innovations are catalogued by the core functions that are the fundamental processes and operations the U.S. Environmental Protection Agency must use in order to perform its mission to protect human health and the environment. Volume 1 presents technical and policy information relevant to each innovation.

Volume 2: Directory of Project Experiments and Results summarizes the more than 50 projects and project proposals Project XL has produced to date. The 16 projects that have been underway for a year or more are described in some detail, including, background, progress in meeting commitments, benefits for the environment, benefits for stakeholders, benefits for the project sponsor, spin-off benefits (where applicable), key issues needing resolution, lessons learned, and information resources. For the 37 projects in implementation for less than one year or still under development, only background information is given.

For a short overview of program accomplishments please see *Encouraging Innovation, Delivering Results* (September 2000) @ *http://www.epa.gov/projectxl/*.

Location of XL Projects



Projects in Implementation December 1999 or Earlier

1. Andersen Corporation, Bayport, MN
2. Atlantic Steel Redevelopment, Atlanta, GA
3. Crompton Corporation Sistersville Facility (formerly Witco), Sistersville, WV
4. DOD: Elmendorf Air Force Base, Anchorage, AK
5. DOD: Vandenberg Air Force Base, Santa Barbara County, CA
6. ExxonMobil Corporation, Fairmont, WV
7. HADCO Corporation, Derry, and Hudson, NH; Owego, NY
8. Intel Corporation, Chandler, AZ
9. Jack M. Berry Corporation, LaBelle, FL
10. Lucent Technologies, Allentown, and Reading, PA; Orlando, FL
11. Massachusetts Dept. of Environmental Protection-ERP, Commonwealth of Massachusetts
12. Merck & Co. Inc., Elkton, VA
13. Molex Incorporated, Lincoln, NE
14. New England Universities Laboratories, Boston College, University of Massachusetts-Boston, University of Vermont
15. NY State Dept. of Environmental Conservation, State of New York
16. Weyerhaeuser Company, Ogelthorpe, GA

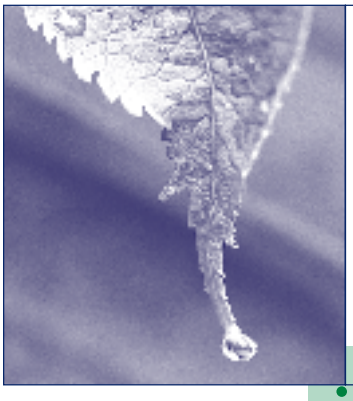
Projects Underway or Under Development Since December 1999

17. Anne Arundel County Bioreactor, Severn, MD
18. Autoliv Automotive Safety Devices, Promontory, UT
19. Buncombe County Landfill, Buncombe County, NC
20. Chicago Regional Air Quality and Economic Development Strategy, Chicago, IL
21. City of Albuquerque, Albuquerque, NM
22. City of Columbus (XLC), Columbus, OH
23. City of Denton, Denton, TX
24. City of Fort Worth, Forth Worth, TX
25. Clermont County Watershed Management Program, (XLC) Clermont, OH
26. Crompton Corporation TBT Project, Greenwich, CT
27. DOD: Naval Station Mayport, Jacksonville, FL
28. DOD: Puget Sound Naval Shipyard, Bremerton, WA
29. Eastman Kodak Corporation, Rochester, NY; Windsor, CO; Peabody, MA; White City, OR
30. Georgia-Pacific, Big Island, VA
31. IBM East Fishkill Facility, Hopewell Junction, NY
32. IBM Semiconductor Manufacturing Facility, Essex Junction, VT
33. Imation Corporation, Camarillo, CA
34. International Paper- Effluent Improvements, Jay, ME
35. International Paper- Emissions Monitoring, Jay, ME
36. Labs21, Nationwide
37. Lead Safe Boston, Boston, MA
38. Louisville and Jefferson Counties Metropolitan Sewer Districts, Louisville and Jefferson Counties, KY
39. Metropolitan Water Reclamation District of Greater Chicago, Chicago, IL
40. Naragansett Bay Commission POTW, Providence, RI
41. National Aeronautic Space Administration White Sands Test Facility, Las Cruces, NM
42. New Jersey Department of Environmental Protection Gold Track Program, State of New Jersey
43. Ortho-McNeil Pharmaceutical, Spring House, PA
44. Pennsylvania Department of Environmental Protection, State of Pennsylvania
45. Port of Houston Authority, Houston, TX
46. PPG Industries, Inc., Pittsburgh, PA
47. Progressive Auto Insurance Company, Nationwide
48. Steele County, Minnesota (XLC), Steele County, MN
49. United Egg Producers, Nationwide
50. USFilter Recovery Systems, Inc., Roseville, MN
51. U.S. Postal Service Denver, Denver, CO
52. Waste Management, Inc. Virginia Landfill Bioreactors Project, King George and Amelia Counties, VA
53. Yolo County Bioreactor, Yolo County, CA

Project XL 2000
Comprehensive Report Index

Volume 1:
Directory of Regulatory, Policy, and Technology Innovation

Executive Summary



In 1995, the U.S. Environmental Protection Agency (EPA) launched an unprecedented new initiative known as Project XL to test innovative ideas that demonstrate environmental eXcellence and Leadership by those who must comply with Agency regulations and policies. Project XL is one of several high-priority initiatives that challenged EPA to think about new ways to fulfill America's environmental and human health protection goals, while simultaneously allowing businesses and other regulated entities to achieve those goals in a smarter, cleaner, and cheaper way.

Experimenting with Innovation

Project XL solicits ideas from private and public sector facilities, states, trade associations, and communities that propose solutions to difficult regulatory or technical problems and explore new approaches to protecting human health and the environment, usually at a lower cost or lessened regulatory burden for the sponsor. In opening the door to experimentation, EPA has sent the message that it values innovation and, above all, wants superior environmental results.

Innovation – An action that starts or introduces something new or creative.

The experiments being conducted under Project XL are in various stages: some are just getting started, others have been underway for several years. In the *1999 Comprehensive Report*, we identified 14 projects with signed Final Project Agreements; as of November 2000, there are 48. What we are learning from these experiments has grown dramatically in the past year. Last year, we identified 35 innovations within projects, this year more than 70 innovations have been identified. The *2000 Comprehensive Report*, Volumes 1 and 2 are intended to be a reference guide for those interested

Seven Agency Core Functions

Regulations
Permit Reform
Environmental Information Management
Enforcement and Compliance Assurance
Environmental Stewardship
Stakeholder Involvement
Culture Change

in the details of Project XL. *Volume 1: Directory of Regulatory, Policy, and Technology Innovations* presents the innovations and lessons learned organized by how they relate to the seven core functions that the Agency typically performs to carry out its mission to protect human health and the environment. Specifically, it discusses the:

- *Experiment*—characterizing the innovation being tested and the regulatory flexibility being sought;
- *Results/anticipated outcomes*—outlining the expected advantage of the innovation over the current approach and the results to date; and
- *Transferability*—detailing the efficacy of the innovation and its suitability for application beyond the pilot scale.

Volume 2: Directory of Project Experiments and Results provides a status report of the more than 50 projects and proposals Project XL has supported to date. *Volume 2* highlights overall program accomplishments, such as cumulative environmental benefits as exhibited below.

Then each project is described including a discussion of the achieved and expected environmental performance, achieved or expected financial and other benefits to the businesses and communities sponsoring projects, achieved or expected benefits to the other stakeholders involved, legal flexibility that allows the project to work, and barriers confronted and lessons learned.

New Approaches to (Old and New) Environmental Problems

Today, EPA has experiments with a variety of partners: Fortune 500 companies and small businesses, state and local government agencies, and communities. Each project has been designed to produce important benefits for the sponsor and the environment. Companies are cutting costs, communities are addressing priority concerns, and regulatory agencies are targeting their resources more effectively. Each of these benefits must meet the standards of superior environmental performance and enhanced environmental protection.

But the intent of the program is not to serve only a select few. The goal of Project XL continues to be much broader—to find solutions that can be integrated into our environmental protection system for everyone's benefit. This goal is being achieved in two ways: first, by creating more options for environmental management and second, by taking a more comprehensive approach to environmental management.

Creating More Options for Environmental Management. Through Project XL, EPA provides companies and other project sponsors with a forum to demonstrate their abilities to find innovative ap-

Selected Cumulative Environmental Benefits*

	1997-1999	1997-2000
emissions eliminated (criteria air pollutants - nitrogen oxides, sulfur dioxide, particulate matter, carbon monoxide)**	20,853 tons	31,775 tons
solid waste recycled	2,089 tons	10,855 tons
water reused	1,069 million gallons	1,846 million gallons

* This summary is based on results reported by Crompton Sisterville (formerly Witco), Intel, Molex, Vandenberg AFB, and Weyerhaeuser.

** Eliminations in emissions are calculated by subtracting reported actual emissions from established baselines for the environmental parameters for each project.

proaches to environmental protection. For example, Project XL provides a way to move state-of-the-art environmental technology from the fringes into the mainstream. It does so by providing companies with the incentives they need to make the requisite testing and evaluation worth their time and investment. We can see in the following examples how, over time, if a technology proves successful and others become more receptive to its use, better results will be achieved for a growing number of people.

- ***Georgia-Pacific Corporation***. At its Big Island, Virginia, pulp and paper mill, George-Pacific is testing a new "gasification" technology to control emissions of hazardous pollutants. One of the byproducts of their manufacturing is a "black liquor," which contains a mix of chemicals used in pulp production. With conventional technology, these chemicals are recovered through combustion evaporation. Preliminary testing shows the new gasification technology uses less energy and significantly lowers emissions of hazardous pollutants. However, the Georgia-Pacific test is the first commercial-scale demonstration and there is some potential that the technology may not work as well as expected. In order for testing of this promising new technology can proceed, EPA will temporarily exempt the company from new hazardous waste emission requirements that are expected to become effective during the experiment.

- ***Molex Incorporated.*** At its electroplating facility in Lincoln, Nebraska, Molex is using new technology to reduce the metal loadings in its wastewater. The new technology separates the wastewater streams from individual metal plating processes, enabling the company to recover different metal contaminants, such as lead and copper, from its wastewater. Molex had expected this new technology to reduce metal loadings to the community's wastewater treatment plant by 50 percent. Molex estimates that the new technology has resulted in an average 65 percent reduction in the concentration of copper, tin and lead, and nickel in the effluent discharged by the wastewater treatment plant in 1999 and 2000.

For the past decade, EPA has been building greater flexibility into regulatory programs through trading of emission "allowances" and other approaches. As the following examples show, in Project XL we continue to find that a little flexibility can go a long way toward getting better results.

- ***Denton, Texas***. Rather than spend its resources monitoring and inspecting wastewater treatment facilities that have excellent performance histories, officials in Denton requested regulatory flexibility to redirect these resources to develop a comprehensive watershed protection program. This approach will support site-specific watershed protection activities, such as developing buffer zones along underdeveloped areas, that are expected to result in better water quality.

- ***New England Universities Laboratories.*** In the Northeast, a consortium of university laboratories proposed a new approach for managing hazardous wastes in laboratory settings. The project enables laboratories to integrate some EPA hazardous waste requirements with Occupational Safety and Health Administration (OSHA) standards for managing chemicals. This approach will potentially lead to better management of the chemicals, which should help prevent pollution and improve worker and student safety.

Taking a More Comprehensive Approach to Environmental Management. Despite strong environmental progress over the past three decades, gaps in environmental protection remain. Communities and facility operators are considering how to meet multiple environmental challenges and socio-economic objectives. The examples below show how in using Project XL, communities and businesses alike are finding that taking a more comprehensive view often leads to better results.

- ***Lead Safe Boston.*** Local communities' environmental priorities play an increasingly important role in decisions about environmental and human health protection. In Boston, Massachusetts, a federally funded program that removes lead from residential homes and apartments asked for approval to use a less

expensive method for handling and disposing of lead-based paint debris. Massachusetts and EPA regulations currently require extensive lead testing on architectural debris and disposal in costly hazardous waste landfills. Through Project XL, Lead Safe Boston identified a potentially more cost-effective option of using a household hazardous waste exception to allow such debris to be disposed of in a municipal solid waste landfill that meets certain performance criteria. With this project, Lead Safe Boston expects to substantially reduce disposal costs, remove lead from more homes, and protect up to 30 more children from lead exposure.

- ***Atlantic Steel Redevelopment.*** In Atlanta, Georgia, a unique public/private partnership has the potential to serve as a national model for creative problem-solving. This redevelopment project expects to demonstrate that the application of "smart growth" concepts can make a difference in addressing transportation and environmental issues. Real estate developers, neighborhood groups, the City of Atlanta, Georgia Department of Transportation, Georgia Environmental Protection Division, and other government agencies are working toward redevelopment of a 138-acre site formerly owned by Atlantic Steel. This project, proposed by Jacoby Development Corporation, includes a multimodal (automobile, pedestrian, bicycle, rail) bridge that would cross and provide access ramps to the adjacent highway as well as connect the site to a nearby MARTA (mass transit) station.

- ***Intel Corporation.*** With the advent of e-commerce and an increasingly global economy, businesses need to be more flexible to change product lines and processes than ever before. First to market is no longer measured in months but days. EPA and the Arizona Department of Environmental Quality approved a facility-wide emissions cap for Intel's semiconductor manufacturing plant in Chandler, Arizona. The new limits allow Intel to make equipment and process changes and to expand production capacity, without regulatory reviews, as long as the total emissions stay below the specified cap. Since the project began, the company has remained well under its emission limits for all applicable pollutants. Intel also has avoided millions of dollars in production delays by eliminating 30 to 50 new source permit reviews a year. The company has found the emission caps so successful that it will invest $2 billion to build a new wafer fabrication facility (Fab 22) at the site. So long as it remains under the existing cap, Intel can proceed with expansion without first going through regulatory review.

Building a National Laboratory for Innovation

As a vehicle for testing new ideas in environmental protection, Project XL is unprecedented. Predictably for an experimental program, it has experienced some conflict and controversy. But it also has brought important discoveries and insights about ways to improve environmental results. Of the many lessons EPA has learned from this unique program, the following are some of the most important:

- It is possible to experiment with new approaches outside the traditional regulatory system as long as strong, reliable safeguards are in place.

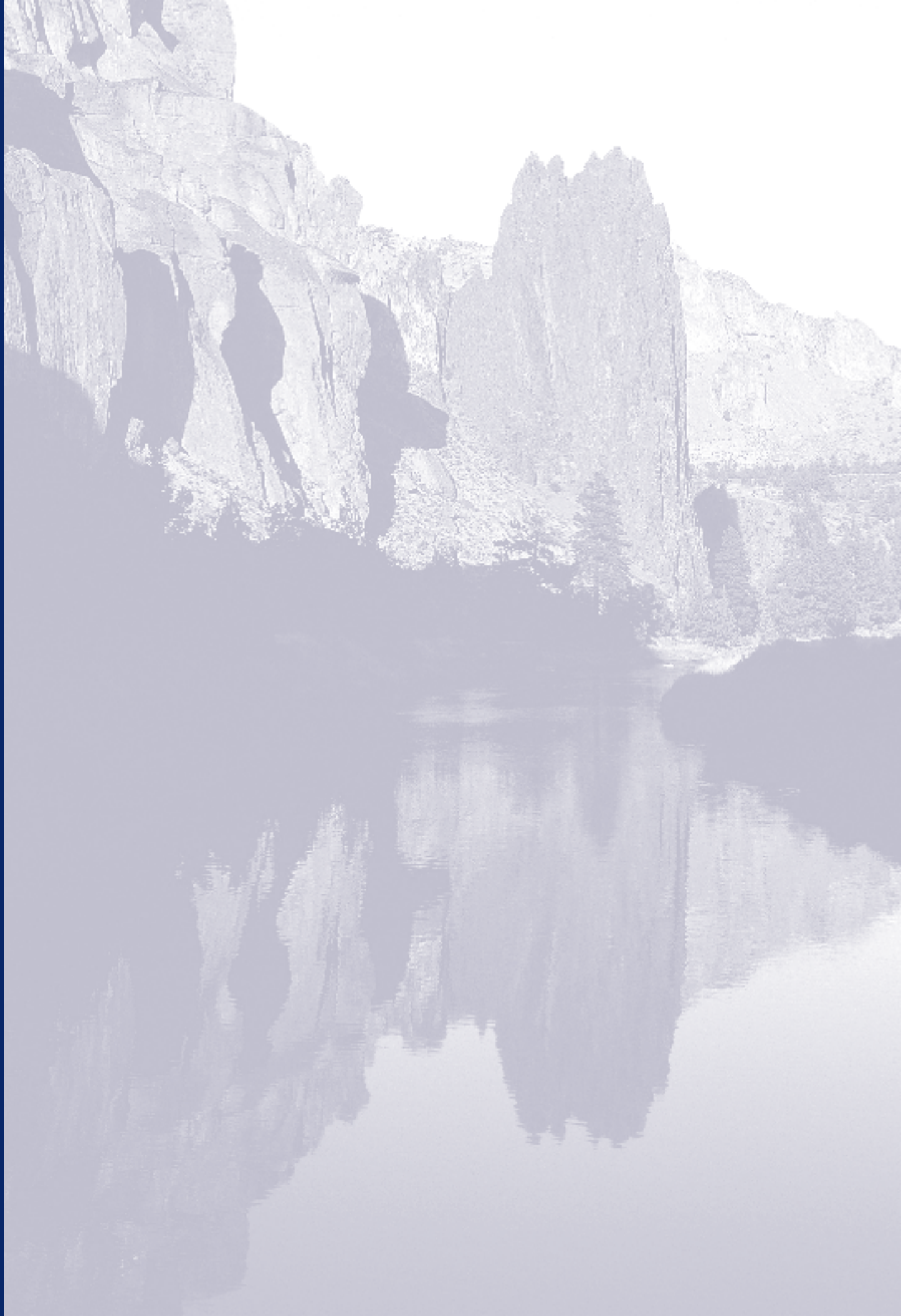
- Some businesses and communities are not only willing, but eager, to take greater responsibility for environmental results if they are given flexibility in meeting the goals.

- If given an opportunity, citizens and other stakeholders can play an active, creative role in finding solutions to problems.

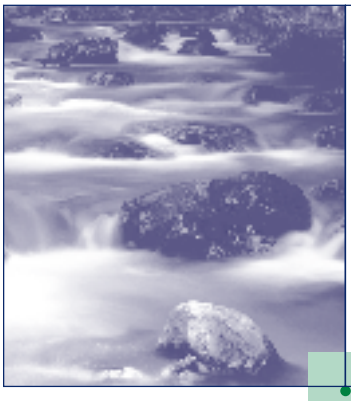
- The opportunities to improve become more visible, and the results potentially more significant, when you step back and look at communities or facilities as a whole, rather than as a set of separate, unrelated components.

With experiments now underway, we have begun cataloging and evaluating the results. This is an important step if we are to progress toward our ultimate goal: bringing successful concepts and approaches to broader application. To realize the true potential of these experiments, we must use what we learn to make improvements in our national programs. In some cases, existing policies and regulations may have to be adapted to reflect more up-to-date knowledge and technology. Already some Project XL innovations have been applied beyond their original experiment. For example, using information from projects that have included plant-wide applicability limits (PALs)—Intel, Merck, Weyerhaeuser, Imation, and Andersen—EPA expects to publish a rule in six months that establishes PALs as a way for facilities to establish emission caps on their total air emissions. This action will allow facilities to make process or manufacturing changes without the need for reoccurring permit modifications and will give greater certainty to community members of the emissions being discharged into the local air. In another example, the Lead Safe Boston project has resulted in a new policy issued by EPA this summer allowing residential lead-based paint debris to be disposed of in municipal landfills, thus enabling contractors across the country to perform lead abatement more quickly and cost-effectively.

We believe that the type of experimentation allowed under Project XL is fundamental to continued advances in environmental protection. Indeed, we believe that sustaining our strong national legacy of environmental progress depends on innovation—at EPA, in state and tribal environmental programs, in local governments, in businesses, in communities—in all parts of our society. That is why EPA launched Project XL, and it is why we will continue supporting and encouraging those that are willing to search for a better way of achieving environmental goals. ❇



Introduction



In the last decade environmental protection has become more complex. We face challenges, like global warming and urban sprawl, that are not addressed through traditional regulatory approaches. To ensure progress on these and other issues, we need strategies that take into account all the factors affecting the quality of our air, land, and water, that respect natural ecosystems, and that reflect the priorities of local stakeholders. We also need to improve regulatory procedures so businesses and communities can focus on problems, not paperwork.

In 1995, the EPA launched a portfolio of high-priority initiatives which challenged us to think of new ways to fulfill America's environmental and human health protection goals. Since then, businesses, communities and other federal agencies have responded to this challenge by participating in these initiatives, including Project XL (which stands for eXcellence and Leadership).

Project XL solicits ideas from private and public sector facilities, other government agencies, trade associations and communities that propose solutions to difficult regulatory or technical problems and that explore new approaches to protecting human health and the environment, usually at a lower cost or lessened regulatory burden for the project sponsor. EPA and these project sponsors formalize the details of these experiments in a document called a Final Project Agreement (FPA) which outlines responsibilities of the project sponsor and describes any regulatory flexibility that EPA or the appropriate state, tribal, and local agency is granting in order to conduct the experiment.

These experiments are leading to improvements in well-established programs and exploration of fundamentally new approaches to protect human health and the environment. By testing sensible, flexible solutions to specific obstacles faced by a facility, a sector, a state or a local community, Project XL champions ideas that yield broader concepts for enhancing our environmental protection system.

This type of flexibility is unprecedented, but it is an offer we have been able to make because we set high goals for environmental performance and insist on public accountability for results. And yet, because we have been breaking new ground, we faced difficult issues in the early stages. We wrestled with questions such as: What kind of flexibility should be allowed? How do you define "better results" and "superior environmental performance"? What can we do within the existing laws? Who needs to be involved in the discussions? We learned

a lot, made adjustments to the program, and found ways to be more responsive to stakeholder needs. As a result, projects are underway throughout the country.

The experiments being conducted under Project XL are in various stages: 16 projects have been underway for a year or more and 37 projects have been in implementation for less than one year or still are under development. Early evaluation results show benefits to the environment, project sponsors, and the communities. Data from several projects give us some indication of the great potential their innovative approaches have for significantly improving our system for managing our environment. In fact, Project XL's greatest opportunity, and its greatest challenge, is taking successful ideas from individual pilot projects and moving these ideas to their appropriate system-wide practice and into EPA's everyday way of doing business. Through experimentation and evaluation, Project XL can add to an ever diversifying set of tools to protect the environment by identifying new approaches, learning about the keys to their effective use, and better enabling EPA to match the right tools to the right problems.

This volume, *Directory of Regulatory, Policy, and Technology Innovations*, describes early results and how lessons learned from these efforts might be incorporated in EPA's everyday work, such as regulation development, permitting, information management and access, enforcement and compliance assurance, environmental stewardship, stakeholder involvement, and Agency culture change. In order to better understand the detailed information contained in this volume, please refer to the Innovations in Core Functions by Project Table on page 14. For summaries of the progress and results of individual projects, please see the second volume, *Directory of Project Experiments and Results*.

Project XL is one of many initiatives that EPA national and regional programs are conducting to address environmental problems that have yet to be solved through the current system. For more information on these initiatives, please see *A Decade of Progress: Innovation at the Environmental Protection Agency* (April 2000) available at *http://www.epa.gov/opeihome/decade/* and the 1999 EPA Innovations Task Force report *Aiming for Excellence: Actions to Encourage Stewardship and Accelerate Environmental Progress* (July 1999) available at *http://www.epa.gov/reinvent/taskforce/report99/*.

Learning From Experiments

EPA's innovation initiatives aim to improve an already strong system of environmental protection while building commonsense, cost-effective ways to "identify important problems and fix them".[1] The United States has one of the strongest systems of environmental protection in the world, but it is neither perfect nor complete. Everyday, conditions are changing: new technology is entering the market, better information is becoming available, and environmental professionals are gaining more understanding and experience in managing their responsibilities. These and other developments mean the system must change too. By giving sponsors a chance to identify problems and potential solutions, Project XL is learning how to adapt environmental protection to the emerging **challenges of the new economy.**

New Challenges

In a development that could revolutionize computing, in Essex Junction, Vermont, IBM is testing a way to make computer chips with copper rather than aluminum—an approach that promises cheaper computers and faster calculations. The new process, which is approximately 30 to 40 percent more efficient than the previous one, enables IBM to deposit a layer of metal on its wafers much more efficiently, maximizing metal use in manufacturing and minimizing releases into the plant's wastewater system.

Project XL emphasizes more comprehensive, integrated approaches to environmental protection, helping to optimize environmental, community, and business outcomes by stepping back and considering all the issues affecting environmental quality. By looking at facilities, sectors, and communities as a whole, we are finding that a broader view often leads to better results. States are actively experimenting with new tools to improve the performance of industry sectors and promoting pollution prevention. Businesses increasingly view environmental management as a fundamental part of a smart business strategy. They recognize that they can realize a competitive advantage while addressing environmental problems. Project XL provides a forum for communities and businesses to step forward with innovations that have improved results, cut costs, and opened the door to fundamentally new ways of doing business—the **new tools of environmental protection**.

[1]Sparrow, Malcom, *The Regulatory Craft*, Washington, DC: Brookings, 2000

New Tools

Both self certification and self audit approaches for small businesses (Massachusetts Environmental Results Program) offer enhanced business accountability with enhanced compliance. Per unit of production emission limits (Andersen and Intel projects) provide an incentive to increase efficiency while maintaining flexibility; and the predictive emissions monitoring system (International Paper project) offers improved environmental performance with reduced capital expenditures.

EPA has embraced innovation as a way to facilitate environmental gains. But clearly, EPA is not alone in pursuing innovative environmental approaches—it has to happen through partnerships with others. Other government agencies, particularly the states, are active players, and local communities play an increasingly important role in environmental and human health protection. They are developing strategies that address their own priorities and concerns and that help sustain the baseline of environmental protection all our citizens have come to expect. These cleaner, cheaper, smarter ways of protecting the environment have challenged EPA to **diversify the role** it plays in environmental protection—from that of Federal command and control regulator to a co-regulator with states, a convener of public discourse, and partner with business and community in pollution prevention.

New Roles for the Agency

Project XL supports new roles for EPA as a co-regulator— supporting new local government water pretreatment operations in the Steele County project, and helping communities link their economic and environmental goals through the Atlantic Steel project.

The following section highlights some of the promising innovations achieved through Project XL to date. It shows preliminary results and takes on the broader task of Project XL—describing better approaches that are being adopted into our national system of environmental protection.

Providing More Flexible Air Permitting Methods

America's industrial sectors face new problems in today's economy. International competition generates continuously changing market demands, which means that companies who can design and develop new products quickly can be more strategic in the marketplace. Under the Clean Air Act, companies must obtain permit approvals from EPA or delegated state agencies when they install new equipment or change a manufacturing process. Each process or type of equipment may have its own permit requirements. Yet some industries, such as pharmaceutical or semiconductor manufacturers, must change their processes frequently to meet customer demands for new products. The paperwork and time required to obtain permit approvals are costly, both for the companies and the government agencies charged with permit review. At the same time, local communities also have an increased awareness and concerns with industry impacts on human health and the environment and are demanding a greater degree of access to facility information and government decision making about permit actions.

Some companies have developed projects under Project XL to make the permitting process more efficient and predictable for their quick-to-market manufacturing needs. These projects are based on facility-wide air emission caps, which prevent the facility from increasing its emissions, but allow process or equipment changes without regulatory approval. Under this approach, facilities must offset any emission increases with a reduction somewhere else within the facility. EPA generally sets the cap below the facility's regulatory threshold for compliance, thus ensuring that the project achieves better environmental results than would otherwise be achieved under current regulatory requirements. This allows the company *flexibility* (e.g., using pollution prevention instead of treatment when that is a better option) in meeting pollution goals. At the same time, it provides certainty to the public by creating an enforceable regulatory cap on total air emissions and to the regulated facility by telling them what they can emit, what they can change quickly, and what limited number of major changes will re-

quire new public review. These permit caps will provide *accountability* to the public by improving their ability to gain a overall picture of a facility's performance and ensuring that emissions will not exceed permitted levels without giving them a new chance to become involved.

EPA and the Arizona Department of Environmental Quality approved a facility-wide emissions cap for Intel Corporation's semiconductor manufacturing plant in Chandler, Arizona. The new limits allow Intel to make equipment and process changes and to expand production capacity, without regulatory reviews, as long as the total emissions stay below the specified cap. Since the project began, the company has remained well under its emission limits for all applicable pollutants. Intel also has avoided millions of dollars in production delays by eliminating 30 to 50 new source permit reviews a year. The company has found the emission caps so successful that it will invest $2 billion to build a new wafer fabrication facility (Fab 22) at the site. Under the existing cap, Intel can proceed with expansion without first going through regulatory review. In announcing this decision, Intel noted that "the new facility will help us maintain our leadership in the extremely competitive world of semiconductors. Fab 22 will give us more manufacturing capacity in order to help us better address our customers' growing need for high-performance microprocessors."

A significant part of Project XL's influence on system change comes from the combined impact of several projects tackling a problem area. New regulations and policy guidance for air permitting that have been heavily influenced by Project XL innovations are described in the following box.

National Clean Air Act Permitting Approaches Influenced by Project XL Innovations

Implementing Site Specific Caps for Determining Major New Source Review (PAL Rule): This forthcoming rule will establish plant-wide applicability limits (PALs) as a way for plants to establish capped limits on their total emissions, providing communities with certainty that emissions will not increase above permitted levels, in exchange for increased flexibility to add and subtract production units without having to go through new source review (NSR) and the associated permitting. Project XL has served as a test bed for several ideas of an alternative major NSR applicability system that allows PALs instead of traditional NSR netting for determining whether modifications are subject to major NSR. Projects that have included PALs as key innovations include Merck, Intel, Weyerhaeuser, Imation, and Andersen.

Part 70 Revisions (Permit Revision Process Rulemaking): This rule will provide industry with the flexibility to make quick operational changes while providing the public and EPA with more efficient and meaningful review of significant actions that could effect air quality. Instead of the current "one size fits all" process, which is paperwork intensive and time consuming for everyone involved, EPA will establish a new five-tiered system, which will provide increased flexibility for simple changes and increased accountability for important ones. The Part 70 changes will allow for an expedited review process for all facilities and will incorporate the flexibility used by the Intel project.

White Paper #3 Guidance: This guidance will provide guidance to states, tribes, and local governments on how to design flexible operating permits, within the scope of Title V of Clean Air Act and the operating permit regulations promulgated at 40 CFR Part 70. The White Paper focuses primarily on "advance approvals" since this is the most versatile and potentially useful approach. This guidance discusses the many considerations and factors relevant to designing a permit that allow for advance approvals of modifications or new emissions units so changes may be made without a permit revision. It also encourages pollution prevention, promotes active public participation, and the achievement of equal or better environmental protection. Projects supporting the development of flexible permitting approaches in White Paper #3 include Merck, Intel, and Imation.

Adding Options for Air Regulatory Compliance

Project XL is providing new ways for manufacturers to address existing compliance problems. At the facility level, manufacturers can find potential opportunities for improving environmental performance, yet these options may require that greater flexibility be added to federal regulations' technology requirements. In a move similar to that of the Intel project, EPA and the Virginia Department of Environmental Quality created a facility-wide emissions cap for Merck's Stonewall pharmaceutical manufacturing plant in Elkton, Virginia. Developed under a Clean Air Act permit that prevents significant deterioration of air quality, Merck's cap also eliminates regulatory review for equipment or process changes as long as the facility's emissions stay below the specified cap. With this approach, Merck is reducing the plant's total emissions of criteria air pollutants by 20 percent, sulfur dioxide emissions by 25 percent, and nitrogen oxides emissions by 10 percent, thus ensuring better environmental results. In addition, Merck will have flexibility under future regulations to lower its cap instead of implementing specific control technologies that might be required for other facilities. When a new criteria pollutant regulation is promulgated and becomes applicable to the site, or when an existing regulation becomes newly applicable to the equipment at the site, Merck has two options. (1) It can comply with the regulation(s) as written and install new control equipment. (2) Alternatively, it can adjust the facility's site-wide emissions cap(s) by the amount of emission reductions that would have resulted from direct compliance with the rule (e.g., reducing the cap by the amount of emissions reductions the new control equipment would have achieved, if it was installed at the site).

Project XL has also allowed manufacturers to use innovative approaches and a wider variety of technologies to control hazardous air pollutants (HAPs). The affect this has had on creating new regulatory options under HAP-related regulations is described below.

1. The 3M Hutchinson XL proposal did not reach final agreement, however, one of the flexibilities 3M requested in their proposal was incorporated in the mid-1999 direct final rule for HAP emissions from magnetic tape manufacturing operations. Based on the 3M proposal and other industry input, EPA determined that it would be useful to offer regulated entities an alternative compliance option for balancing HAP emissions from solvent storage tanks with emissions from other pieces of magnetic tape manufacturing equipment.

2. In 2001, EPA plans to promulgate National Emission Standards for HAPs (NESHAPs) for "miscellaneous organic processes." These standards are referred to as the miscellaneous organic NESHAPs or "the MON." Production activities at Crompton Sistersville, West Virginia, facility are classified as one type of these miscellaneous organic processes. It is expected that the MON will require a level of process vent controls similar to the level required for the vent incinerator installed by Crompton as part of its project. Thus, this project is providing some preliminary data for the MON on the effectiveness of this type of air pollution control technology in satisfying HAP compliance requirements.

3. Innovations being tested as part of the Weyerhaeuser project helped shape several compliance options in the Integrated Pulp and Paper NESHAP and Effluent Limitations Guidelines Rule promulgated in 1998. Three specific regulatory flexibilities undergoing testing include using: alternative compliance regimes for HAP emission reductions, advanced technologies to reduce effluent discharges, and pollution prevention technologies to reduce air emissions in kraft-pulping operations.

Increasing Alternatives for Safe Handling, Disposal and Recycling of Waste

Local communities and businesses are concerned with the impact that the handling and disposal of wastes can have on both quality of life for their citizens and the community's economy. Designing methods that increase safety and reduce costly hazardous waste generation are critical to these concerns. As described below, changes to Resource Conservation and Recovery Act (RCRA) policies are underway or under consideration as a result of information learned from Project XL.

- EPA is releasing a national RCRA policy determination that will allow the use of an alternative disposal technique for lead-based paint architectural debris from *residential* sources. Under Project XL, Lead Safe Boston (a Boston, Massachusetts, city government entity) is testing the use of a RCRA Household Hazardous Waste Provision exclusion that would allow the disposal of *residential-generated*, lead-based paint debris in RCRA-certified municipal waste landfills. Lead Safe Boston believes that lead-based paint debris can be safely managed in municipal solid waste landfills that meet RCRA requirements for landfill liners, leachate collection systems, groundwater monitoring, and corrective action provisions. It is expected that this decision will enhance the cleanup of more lead-contaminated sites within urban areas because of the lower costs associated with handling and disposal of non-hazardous designated wastes. In addition, it is expected to facilitate additional residential abatement, renovation and remodeling, and rehabilitation activities, thus protecting children from continued exposure to lead paint in homes and making residential dwellings lead safe for children and adults. Specifically, Lead Safe Boston expects to substantially reduce disposal costs, remove lead from more homes, and protect up to 30 more children from lead exposure. EPA has used data generated during the development of the Lead Safe Boston project and other sources to support its recent policy determination.

- Every day many products containing economically valuable metals are being disposed of as hazardous waste because few alternatives for resource recovery exist. The USFilter project proposes to eliminate or substantially reduce the need for electroplators (i.e., metal finishers, printed wiring board manufacturers) to treat and/or dispose of their F006 hazardous waste streams. USFilter proposes to offer "portable exchange deionization systems" (ion exchange canister) to electroplators in lieu of on-site physical-chemical treatment and off-site disposal requirements. Once their resins become spent, these canisters can be recharged by USFilter who regenerates the resins. The reclaimed metals then can be sold rather than land disposed. EPA is considering altering its RCRA manifest and waste treatment requirements for electroplators who elect to use ion exchange canisters for some or all of their F006 waste handling requirements.

- RCRA hazardous waste manifest and waste accumulation requirements often entail high transportation and collection costs associated with low volume waste disposal. The New York State Department of Environmental Conservation (NYSDEC) project is testing a solution to this problem by allowing utilities (primarily electric and gas companies) located in the state to consolidate their hazardous waste generated at remote locations at central collection facilities (utility owned) before the waste is sent to a commercial RCRA permitted treatment, storage, and disposal facility (TSDF). Currently, utility hazardous waste generators must have their wastes collected individually at remote sites and transported directly to a TSDF. In many instances, this results in a large number of vehicle trips to transport small waste loads. As a result of the data generated from this project, EPA is considering the modification of its RCRA waste accumulation and manifest

provisions for utilities to allow national adaptation of the New York-based system.[2]

- Municipal solid waste landfill capacity is dwindling in United States and there is a great deal of interest in how to design and manage landfills to extend their useful life. There are four project proposals currently being reviewed that explore various options for using leachate recirculation systems (bioreactors) to extend the life of existing sanitary landfills by speeding up the decomposition process of organic materials, thereby creating more space in the landfill and extending its life. Each project—Buncombe County, Virginia Landfills, Yolo County, and Anne Arundel County—will be exploring different aspects of a bioreactor system. Collectively, the various engineering and technical parameters being investigated among these projects will provide EPA with background data to determine if it is appropriate to modify existing RCRA municipal landfill design requirements.

Identifying New Procedures for Water Regulatory Compliance

In February 1999, the Administration unveiled a comprehensive Clean Water Action Plan, highlighting the public's concern for protecting the nations' waters. In a July 1999 proposed rule affecting the National Pretreatment Regulations, EPA sought to streamline the procedures for measuring pollutant loadings for industrial waste water dischargers. Under the proposed rules, publicly owned treatment works (POTWs) have the option of using mass-based limits in lieu of concentration limits for industrial users if these users meet certain criteria. The rule proposes that potential users (dischargers to the POTW) must install the best available technology (BAT) or have equivalent BAT installed, and they must use some form of water conservation methods that substantially reduce their water usage.

The Steele County project is referenced in the proposed Pretreatment rule as one example of a mass-based compliance experiment. Under Project XL, the POTW of Steele County, Minnesota, will allow participating industrial users to use mass-based limits in lieu of concentration limits for discharges to the wastewater treatment facility. These industrial users are primarily metal finishing facilities in Owatonna, Minnesota. Using a mass-based limit will allow industrial dischargers to minimize their water usage while maintaining compliance with their POTW requirements. Using a concentration limit would not allow this to occur. Steele County also is testing other alternative compliance approaches such as reduced monitoring for regulated pollutants not present and alternative significant noncompliance reporting. Collectively these approaches toward complying with pretreatment regulations can help establish a benchmark against which EPA and other regulators will determine whether these aspects of the regulations should be permanently modified.

[2]On October 7, 1999, the Atlantic States Legal Foundation and other parties filed a Petition for Review of EPA's final Project XL Rule for New York State Public Utilities in the U.S. Court of Appeals for the District of Columbia Circuit. EPA is currently exploring the option of settlement with these petitioners.

Innovations in Core Functions

The more than 70 innovations tested under Project XL are sorted by EPA's core functions—the processes and operations that EPA typically performs to carry out its mission to protect human health and safeguard the natural environment—(1) regulations, (2) permitting, (3) information management and access, (4) enforcement and compliance assurance, (5) environmental stewardship, (6) stakeholder involvement, and (7) Agency culture change. These core functions are defined briefly below.

Regulations

A significant portion of EPA's work concerns developing regulations that define for businesses, municipalities, other regulated entities, and the public the actions, technologies, and standards required to meet federal environmental laws passed by Congress. Under Project XL, EPA seeks to explore new and flexible approaches to implementing existing and future environmental regulations. Projects have provided Agency regulation writers with experiential data and results that influence the options available in new regulations. Project XL has been particularly successful at exploring specific regulatory and policy options under the Clean Air Act (CAA), the Resource Conservation and Recovery Act (RCRA), and the Clean Water Act (CWA).

Permitting

A permit is an authorization, license, or equivalent control document issued by EPA or a state or tribal agency to implement the requirements of environmental standards for a specific facility or group of similar facilities. Federal permitting requirements are very important environmental protection tools, but they can pose a burden for regulated entities and regulators alike. The alternative permitting approaches tested in Project XL fit into a national reform effort to shift permitting toward measuring performance while providing more flexibility in how standards are met, strengthen the role of the public in important decisions, focus on results instead of procedures, reduce unnecessary burdens, and improve environmental performance.

Information Management and Access

EPA has national information policy and management responsibilities which stem from the nation's environmental laws and include collecting, maintaining, and ensuring the quality of data used for both internal decision-making and public purposes. EPA's regulations and permits have data collection and reporting requirements that can be burdensome for facilities to prepare and for regulators to collect, when publicly presenting environmental information and results. In many cases, state and tribal governments are the primary collectors and managers for this information. The required data are often in a specified format that is difficult for the general public to access and understand. Project XL explores different approaches that seek to improve government systems for managing environmental information. These approaches include gaining more stakeholder input on data presentation, building performance-based incentives into reporting requirements, and eliminating duplicative or unnecessary information requirements.

Enforcement and Compliance Assurance

EPA, tribal governments, and authorized states are responsible for ensuring that the regulated community complies with the laws and regulations that protect human health and safeguard the natural environment. To do so, an array of approaches are employed, including EPA's traditional regulatory enforcement program and compliance assistance support and incentives. In recent years, national efforts have centered around identifying and addressing environmental problems using innovative, integrated initiatives that combine compliance assistance, incentives, monitoring, and enforcement. These compliance incentives include self-certification, compliance measurement and management programs, tiered compliance testing requirements, and options to use new technologies that will ensure compliance by preventing pollution. Compliance incentives encourage improved environmental performance and have been explored by states, tribes, local governments, and EPA. Project XL provides another platform for testing these new activities as well as innovative approaches for measuring compliance on a facility and sector level.

Environmental Stewardship

Environmental stewardship is a way of identifying and pursing good business strategies that are consistent with environmental protection. Environmental management systems (EMS), pollution prevention, and recycling are pathways to environmental stewardship that help organizations improve their environmental performance and potentially go beyond regulatory compliance. An EMS allows an organization to systematically integrate environmental concerns into business and operations decisions, address environmental decisions and focus on improvements in compliance rates, while boosting efficiency, compliance rates, and improving worker safety. Pollution prevention, or "source reduction" as defined by the 1990 Pollution Prevention Act and EPA guidance, involves protecting natural resources through conservation or increased efficiency in the use of energy, water, and materials. Recycling shares many of the advantages of pollution prevention: they both reduce the need for treatment or disposal by conserving energy and natural resources. Project XL is a platform for testing different EMS approaches, and many projects have incorporated pollution prevention and recycling activities into their agreements.

Stakeholder Involvement

The American people have demanded active involvement in decisions that affect their health and the quality of their environment. In response, EPA has worked to increase stakeholder involvement

by providing them opportunities to participate in the development and implementation of projects that may affect them. A stakeholder may be a civic organization, particular interest group, governmental entity, or individual. Past, present, and potential participants in Project XL have identified the stakeholder involvement process as an area in which all groups (e.g., project sponsors, government staff, and public participants) will benefit from additional experience and better guidance. These projects are producing important insights into the site-specific, multi-stakeholder involvement process and its role in Agency experimentation and innovation.

Agency Culture Change

The emphasis on innovation has changed the way EPA thinks and operates, leading to real environmental improvements and cost reductions. The challenge ahead is to make these innovative ideas a permanent part of EPA's culture and reinforce those Agency processes and behaviors that will address constantly changing conditions—environmental, technical, socioeconomic, and political—through new, creative solutions. Project XL has served as a laboratory for creating a work environment that supports cross-Agency multimedia innovation. While designing and testing potential innovations, the Agency has also undertaken management, team-building, and experimentation challenges. ❇

Ongoing Innovations

This section catalogues 50 ongoing innovative ideas being tested under Project XL. These innovations are generally from the more mature projects underway. The catalogue uses the following structure to describe these innovations:

- *Experiment(s):* What is the innovative idea being tested? Which projects are testing the innovation? What regulatory flexibility is required to test the idea?

- *Results/Anticipated Outcome(s):* What is the potential advantage of the innovation over the current system of environmental protection? Included are data that document results and data for those projects that are "more mature." For those projects still early in implementation, this section provides the operating context for the innovation and anticipated results of the experimental approach.

- *Transferability:* What is the efficacy of the innovation? Is it suitable for application beyond the pilot scale? For the more mature innovations, the transferability section describes those innovative concepts that have been, or are in the process of being, incorporated into Agency functions or programs. For the relatively new innovations, this section describes potential opportunities for integrating the experimental ideas into the national environmental protection system.

The table below is a summary of the types of ongoing innovations sorted by EPA's core functions. This table is designed to give the reader a "roadmap" for this section. It is *not* intended to be used as a checklist for future projects.

Table 1: Innovations in Core Functions by Project

	Regulations	Permitting	Information Management	Enforcement Compliance	Environmental Stewardship	Stakeholder Involvement	Culture Change
Andersen		X					
Atlantic Steel	X						
Berry		X	X		X		
Albuquerque POTW	X						
Denton POTW	X						
Crompton (formerly Witco)	X				X		
Elmendorf AFB		X					
NS Mayport					X		
Vandenberg AFB					X		
ExxonMobil	X					X	
Georgia Pacific				X			
HADCO	X					X	
IBM Vermont	X						
Imation		X					
Intel		X	X		X	X	
International Paper-EI		X					
International Paper-PEM			X	X			
Louisville POTW	X						
Lucent					X		
Massachusetts DEP				X			
Merck		X	X	X		X	
Molex	X						
New England Universities Laboratories	X				X		
New York State DEC	X		X				
Progressive					X		
Steele County	X		X				
USPS Denver					X		
Weyerhaeuser	X	X	X	X	X	X	
Programwide						X	X
3M (Proposal)	X						

Regulations

Project XL has helped to identify and test new, flexible options under federal regulations. To date, project proposals have focused on hazardous air pollution and conformity issues under CAA regulations, process streamlining for RCRA hazardous waste compliance, promoting metals recovery within RCRA hazardous waste requirements, improving the effectiveness of CWA pretreatment operations, and streamlining cleanups under CERCLA (known as Superfund). Project XL will continue collecting data about new regulatory proposals and will influence how well-established rules are interpreted and implemented. New projects are proposing to explore regulatory changes that can enhance our solutions for increasing the capacity of sanitary landfills, reducing urban air toxic emissions, and decreasing persistent, bioaccumulative, and toxic pollutants.

Because of the large number of regulatory innovations underway, these innovations have been organized according to media—air, hazardous waste, water, and site cleanup. Under each sub-section, Tables 2 through 5 identify the regulatory innovations being tested in current projects and illustrate the adaptability that is possible in complying with existing regulatory requirements.

Air Regulations

A large proportion of EPA's rulemaking activities have involved the ongoing development of National Emission Standards for Hazardous Air Pollutants (NESHAPs). These standards are required by Section 112(d) of the CAA, which dictates that EPA regulate the emissions of 189 hazardous air pollutants (HAPs). The intent of Section 112 is to protect public health by requiring new and existing "major sources" of these HAPs to reduce their generation through pollution prevention or to control their emissions to the level possible through the use of Maximum Achievable Control Technology (MACT). This technology-based requirement must take into account cost, non-air quality impacts, and energy requirements. NESHAPs are generally structured in terms of numerical emissions limits, although under certain conditions they can specify a design, equipment, work practice, or operational standard.

According to the CAA, no transportation activity can be funded or supported by the Federal government unless it conforms to the purpose of a state's air quality plan. Though conformity was included in the 1977 CAA, it was not clearly defined until the 1990 CAA amendments. Conformity links transportation planning with air quality planning, and func-

Table 2: Air Regulatory Innovations

Project(s)	Affected Media	Innovation
Weyerhaeuser	Water	*Pulp and Paper Cluster Rule*: Voluntary effluent discharge limitations—allows additional time for MACT standards compliance; testing alternative compliance approaches for HAPs; using pollution prevention technologies to reduce HAP emissions across the facility provides additional time to comply with MACT standards.
3M Proposal	Water	*NESHAP for Magnetic Tape Manufacturing Operations MACT:* Modification to NESHAP based on data submitted in proposal regarding balancing HAP emissions between controlled and uncontrolled sources.
Crompton (formerly Witco)	N/A	*RCRA Organic Emission Standards/ Miscellaneous Organic Processes MACT:* Early compliance with NESHAP and air emission control flexibility; use of alternative control technology, reducing organic air emissions and potential compliance with a new MACT standard.
Atlantic Steel	Site Cleanup	*CAA Transportation Control Measure (TCM):* Flexibility and smart growth applications of a TCM for a brownfield redevelopment project moving forward in area previously out of conformity with CAA.

tions by means of reinforcing a state's air quality plan and keeping areas on track in meeting their air quality goals. It requires areas that have poor air quality now or had it in the past to examine the long-term air quality impacts of their transportation system and ensure that it is compatible with clean air goals. These areas must assess the impacts of growth up front and decide how to manage it.

Pulp and Paper Cluster Rule

The Experiment(s): The Weyerhaeuser project has been in implementation since early 1997. While the project will be using a site-specific rulemaking to authorize MACT compliance, it has helped to verify compliance options in the MACT standard provisions of the Pulp and Paper Cluster Rule. Flexibility for Weyerhaeuser under Project XL paralleled two major aspects of the Cluster Rule: bleach plant and kraft pulping operations.

The Pulp and Paper Cluster Rule was promulgated in April 1998. The Water Effluent Limitations Guidelines and Standards portion of the rule requires more stringent reductions for toxic pollutants in the wastewater discharges during the bleaching process and in the final discharge from the mill. The Effluent Guidelines Voluntary Advanced Technology Incentives Program, a compliance option incorporated into the Cluster Rule, encourages bleach plant operators to install advanced technologies or make process changes that will reduce effluent discharges beyond the rule's limits. If a pulp and paper mill enrolls in this program and can meet the strict discharge limits through advanced technologies, the facility receives reduced monitoring and inspection opportunities and additional time to comply with the air (e.g., NESHAP) portion of the rule. Although not required by the Cluster Rule, Weyerhaeuser has conducted a feasibility study of plant-wide effluent reductions through innovative technologies. While Weyerhaeuser's Flint River facility is not participating in this program, it expects to exceed the effluent requirements for this Cluster Rule option. In addition, the facility has helped to confirm the usefulness of this incentive program and its potential to achieve stronger environmental performance.

Voluntarily reducing hazardous air emissions from process water streams is another compliance option for kraft-pulping operations that was incorporated under the Pulp and Paper Cluster Rule. The Clean Condensate Alternative Program focuses on reducing the HAP emissions throughout the pulp mill by reducing the HAP mass in process water streams. By lowering the HAP mass loading in wastewater streams, fewer HAPs will be volatilized to the atmosphere. Many of the pollutants emitted from production vents originate in mill condensates that circulate throughout the mill. If a mill can reduce these condensates instead of controlling individual specified vents, they will achieve greater air emission reductions and reduce their compliance costs. Although not participating in this alternative program, Weyerhaeuser's willingness to redesign its mill to reduce vent condensate streams throughout the facility was instrumental in formalizing this opportunity within the Cluster Rule requirements.

The Pulp and Paper Cluster Rule also provides incentives for using pollution prevention technologies in kraft pulping operations. The MACT standards provide for an extension of up to eight years from promulgation for compliance if pollution prevention approaches that otherwise would not have been used are used. Pulp and paper facilities will have the flexibility to demonstrate HAP emission reductions using innovative pollution prevention approaches in lieu of, or in addition to, end-of-pipe HAP controls. This extension is designed to encourage mills to install pollution prevention technology that will reduce HAP emissions from the pulping process as well as both air and water pollutant discharges from the bleaching process. Aside from the incentives offered to all pulp and paper manufactures in the Cluster Rule, the Weyerhaeuser project is demonstrating pollution prevention approaches to reducing HAP emissions. These approaches include reducing process condensate wash water HAP content, reducing bleach plant HAP emissions, reducing oxygen delignification HAP emissions, and reducing cylinder mould decker and filtrate tank HAP emissions.

Results/Anticipated Outcomes: The Cluster Rule will have significant national environmental impacts as mills covered by the rules move to comply with its requirements. Compliance with the rule is expected to result in elimination emissions of more than 160,000 tons of toxic air pollutants (59 percent of current levels), reduced chloroform discharges to water by 99 percent from proposed levels, reduced dioxin and furan discharges to water by 96 percent from proposed levels, and reduced dioxin and furan loading to sludges by 96 percent from proposed levels.

For this project, Weyerhaeuser has agreed to investigate methods to reduce bleach plant flow toward a long-term goal of a 50 percent flow reduction to 10 cubic meters per air-dried metric ton of finished product (fluff pulp used to make diapers). Weyerhaeuser conducted a feasibility study to determine the effect of bleach plant effluent reduction on product quality. Weyerhaeuser stated in its 1999 Project XL Annual Progress Report, "Based on the completed feasibility study, the current path forward is not technologically and economically feasible. …Weyerhaeuser remains committed to this MIM project and will seek alternate ways to move toward the goal." Projected environmental benefits include (1) a 2-million-gallon-a-day monthly average water use reduction (the bleach plant water requirements are approximately 50 percent of the total plant water usage); (2) reductions in effluent biological oxygen demand, total suspended solids, and adsorbable organic halides; and (3) HAP emission reductions. If the effluent reduction goal is determined to be feasible [determined as part of the process to renew the facility's National Pollutant Discharge Elimination System (NPDES) permit in 2002], a schedule will be prepared to achieve flow reductions by the year 2006.

Weyerhaeuser has prepared a site-specific MACT compliance plan. This plan documents HAP emission reductions that have been realized at the Flint River Facility. A review of the data has shown that the facility is collecting and destroying more HAPs than is required under the Cluster Rule. A draft site-specific MACT rule has been prepared, and it is anticipated that this rule will be proposed soon.

Transferability: The Pulp and Paper Cluster Rule has been promulgated and now regulates toxic air pollutants in 155 of the 565 pulp, paper, and paperboard mills in the United States. Ninety-six of those 155 mills also have their toxic water discharges regulated by the rule. Individual mills may choose the control technologies and process change combinations that are the most advantageous for them to meet these regulations. As noted earlier, data and information from the development of the Weyerhaeuser project helped to inform many of the compliance options associated with the rule.

NESHAP for Magnetic Tape Manufacturing Operations MACT

The Proposal: The 3M Hutchinson XL proposal did not reach final agreement. However, one of the flexibilities 3M had requested is being used in the revised Magnetic Tape Manufacturing operations MACT standard. This standard, a recent amendment to a 1994 industry-specific HAP rule, illustrates EPA's willingness to amend regulatory requirements when the regulated community can provide persuasive data suggesting new alternatives. Since the 1994 rule was issued, 3M provided EPA with data showing that the volume of HAP emissions from uncontrolled solvent storage tanks is very close to that of HAP emissions from uncontrolled vessels of mix-preparation process equipment. By balancing emissions from these uncontrolled sources against those sources in the process line that are controlled, 3M was able to suggest alternative control options. EPA accepted 3M and other industrial data and proceeded to amend the 1994 rule providing facility owners and operators with 25 options for "undercontrolling" tanks and/or mix-equipment vessels based on the level of control they achieve on their coating lines. 3M developed these data in conjunction with a regulatory flexibility proposal the company submitted to Project XL.

Results/Anticipated Outcomes: The revised Magnetic Tape rule was effective in June 1999 and is expected to increase compliance with this regulation, enhance flexibility for affected entities and save companies money in compliance costs. EPA pub-

lished this MACT rule amendment as a direct final rule because it considers this a noncontroversial change. EPA believes that this change to the previously promulgated 1994 rule will increase compliance flexibility for affected sources without any adverse environmental consequences.

Transferability: The MACT rule amendment is a permanent change to an earlier promulgated rule. It is expected that this amendment will increase compliance with this regulation, enhance flexibility for affected entities, and reduce companies' compliance costs.

RCRA Organic Emission Standards/ Miscellaneous Organic Processes MACT

The Experiment(s): The Crompton (formerly Witco) project aims to reduce air emissions through a combination of flexible air pollution control and waste minimization/pollution prevention (WM/PP) activities. The polyether methyl capper unit at Crompton's Sisterville, West Virginia, plant is the focus of air emission control efforts. The capper unit is the site of a two-step reaction that results in one of Crompton's products, methyl-capped polyether. Methyl chloride, dimethyl ether, and methanol emissions generated in the capper unit during production of the methyl-capped polyether will be collected and routed to a new process vent incinerator installed on the capper unit.

EPA and West Virginia Department of Environmental Protection (WVDEP) deferred the RCRA Subpart CC organic air emission standards applicable to Crompton's two surface impoundments. These surface impoundments are 1-million-gallon reservoirs that hold wastewater from the facility's pollution control equipment and other sources. Without the deferral, the Subpart CC standards would have required Crompton to install air emission controls on these impoundments. However, Crompton could have replaced the existing reservoirs with open-top reservoirs that are not regulated under RCRA Subpart CC, and air emissions would not have been reduced. With the deferral, Crompton will now install a vent incinerator on the capper unit.

Based on an XL-generated site-specific rule, Crompton installed the vent incinerator in lieu of complying with RCRA organic air emission standards. In 2001, EPA plans to promulgate NESHAPs for "miscellaneous organic processes," called "the MON." Production activities at Crompton's Sistersville facility are classified as one type of these miscellaneous organic processes. Based on current understanding, it is expected that the MON will require a level of process vent controls similar to the level required for the vent incinerator installed by Crompton under the project. While the Sistersville project will provide superior environmental performance only until the MON is in effect, the Crompton project has provided a test bed for experimenting with air emissions control technology under RCRA. The project's FPA requires a reevaluation of the project following proposal of the MON. Crompton will prepare a project reevaluation report within 90 days following the close of the comment period for the MON. If EPA, WVDEP, and other stakeholders agree to continue the project, the FPA will be amended to identify new approaches to achieve superior environmental performance beyond the MON requirements.

Results/Anticipated Outcomes: Installing a process vent incinerator on Crompton's capper unit in return for a deferral of air emission standards for its surface impoundments will lead to air emission reductions several years earlier than would have been obtained without undertaking the project. As required by a site-specific rule, the vent incinerator has destroyed at least 98 percent of the organic compounds (about 271,000 pounds) in the vent stream. In 1998, the capper unit emitted a total of 59,898 pounds of organic compounds. Since the vent incinerator was installed and put into operation, air emissions of total organics have been reduced by over 217,000 pounds per year as compared with 1995 baseline levels. Performance tests indicated that the oxidizer is reducing total organics in the vent stream by 99.99 percent, versus the 98 percent minimum required by the facility's site-specific rule. In addition, undertaking this project will allow Crompton to defer the expenditure of approximately $2 million in environmental control costs for several years.

Transferability: The Crompton project demonstrates the potential benefits for allowing air emission control technology flexibility under RCRA regulations in order to provide superior and more cost-effective environmental protection. Flexibility in the control of air pollutants by Crompton's Sistersville plant demonstrates the adaptability that is possible in complying with air regulatory requirements. Similar adaptations may be applicable to other plants that are facing similar compliance problems and should be investigated relative to existing and future air emissions issues.

CAA Transportation Control Measure (TCM)

The Experiment(s): The Atlantic Steel project will redevelop a 138-acre brownfield site in downtown Atlanta. The redevelopment will integrate residential, office, retail, transportation, and entertainment functions near Atlanta's central business district and incorporate many "smart growth" design principles in the project. In addition to returning a contaminated site to productive use, this project will examine how redevelopment can leverage environmental benefits in air quality by reducing automobile use in the Atlanta region. Under Project XL, this brownfield development will be considered a TCM. A TCM is defined as a measure—an activity undertaken, a transportation project built, or a program implemented—used to reduce motor vehicle emissions. Classification as a TCM will enable this project to proceed with Federal approval and use Federal funds during the transportation conformity lapse in the Atlanta metropolitan region.

Although the State of Georgia is seeking to redesignate for attainment, at the time the Atlantic Steel final project agreement was being developed, the City of Atlanta was out of compliance with Federal CAA standards for ground-level ozone emissions. Between January 1998 and July 2000, the Atlanta Regional Commission had failed to demonstrate that new transportation activities will not further degrade or delay timely attainment of air quality standards for the region. The CAA generally prohibits new transportation construction projects that use Federal funds or require Federal approval in areas where conformity with CAA requirements has lapsed. Under the CAA, a project must demonstrate an air quality benefit to be considered a TCM. In a traditional sense, the Atlantic Steel project would not qualify as a TCM, but EPA views the combination of transit linkages (17th Street Bridge), site location, site design, and other elements collectively as a TCM.

In order to evaluate the potential environmental impacts of the Atlantic Steel development project, EPA, in consultation with project stakeholders, performed three main analyses: (1) regional transportation and air emissions impacts, (2) local CO impacts, and (3) site level travel and multimedia impacts.

Results/Anticipated Outcomes: EPA completed an environmental assessment for the Atlantic Steel project in compliance with the National Environmental Quality Policy Act. While the project is still undergoing State Implementation Plan (SIP) approval, it is proceeding based on the premise that the unique "livability" attributes and interconnected design of this specific project will result in long-term air quality benefits for the region. EPA evaluated the air quality benefits of this project based on the fact that (1) the Atlanta metropolitan region is projected to continue to grow over the next 20 years and (2) if the Atlantic Steel site were not redeveloped, more of this growth would occur in outlying areas. By comparing this development of a brownfield to similar development of greenfield sites, the Atlantic Steel project and its associated transportation measures were linked to analyze the overall air quality effects of the development. An analysis of regional transportation and air emissions impacts of the Atlantic Steel development showed that by absorbing a larger portion of Atlanta's growth, the Atlantic Steel project would create as many as 34 percent fewer vehicle miles traveled (VMTs) and reduce associated NO_x emissions by 45 percent when compared to growth occurring at alternative greenfield sites.

The impact that site design can have on transportation patterns and air emissions was analyzed as well. EPA examined measures such as density, mix of use, connectivity, and transit access to see how site design implementation might affect travel behavior and, ultimately, air emissions.

Transferability: Urban growth has resulted in increased traffic congestion, continued encroachment on green spaces, and resultant air quality conformity problems. The Atlantic Steel project—an integrated, mixed-use, multimodal project, located near the central business district—can serve as a model for future smart growth planning and redevelopment. As more cities struggle with urban development, transportation, and air quality problems comparable to those in Atlanta, many aspects of this project will have the potential to be transferred to these locations. EPA is in the process of drafting policy guidance identifying methodologies to help account for the air quality benefits of brownfield developments in the air quality and transportation planning process. As the Atlantic Steel project proceeds, there will be a need to analyze if the regulatory flexibility that will enable the project's site design to positively impact transportation and air quality can provide opportunities to maximize environmental performance at comparable redevelopment sites.

Hazardous Waste Regulations

RCRA regulations classify hazardous waste as either characteristic or listed. Characteristic wastes have measurable properties that indicate that a waste poses enough of a threat to require regulation. EPA established four hazardous waste characteristics: ignitability, reactivity, corrosivity, and toxicity. Listed wastes come from generic industrial processes, certain sectors of industry, and unused pure chemical products and formulations.[3] F006 wastes—wastewater treatment sludges from electroplating operations—have been the subject of several projects.

Table 3: Hazardous Waste Regulatory Innovations

Project(s)	Innovation
New York State DEC	*RCRA Streamlining—Waste Handling Waiver:* Revisions to streamline remote waste handling and transportation. Satellite waste consolidation.
New England Universities Laboratories	*RCRA Performance-based Environmental Management Standard:* Laboratory environmental management standard to streamline RCRA and OSHA regulatory programs.
Molex, HADCO	*RCRA Streamlining—Delistings and Variances:* Conditional delistings and solid waste variances to encourage metals recovery and recycling; optimizing the recovery of metals by operating a segregated treatment system; testing F006 waste stream and copper dust recycling.
IBM Vermont	*Process Exemption—Innovative Copper Metallization*: IBM-VT has introduced a new, innovative copper plating process to deposit a layer of metal on the wafer and is seeking a site specific process exemption from the F006 listing for its copper plating process rinsewater.

[3]These wastes are listed according to waste categories, such a F, K, P, and U. Wastes from non-specific sources are F codes, wastes from specific sources are K codes, and wastes from commercial products are U and P codes. Wastes from non-specific sources include material-specific wastes generated by a variety of processes. This category of wastes include solvent wastes, electroplating wastes, metal heat treating wastes, and dioxin-containing wastes.

RCRA Streamlining—Waste Handling Waiver

The Experiment(s): The New York State Department of Environmental Conservation (DEC) project allows participating electric, telephone, oil, and gas utilities located in the state to consolidate the hazardous waste generated at remote locations at utility-owned central collection facilities (UCCFs) before the waste is sent to a permitted treatment, storage, and disposal facility (TSDF). Utilities maintain right-of-ways, such as pipelines, phone lines, and power distribution systems that can extend for hundreds of miles. In the process of accessing these systems at remote locations, hazardous waste is generated in the form of contaminated sediments accumulating at utility service access points. Access points for electric power and phone systems can vary from manholes and street vaults to remote service boxes. RCRA regulations allow the accumulation of hazardous waste at remote locations for up to 90 days without a permit but generally do not allow shipment to or consolidation of hazardous waste at off-site locations other than permitted TSDFs.

Utilities are currently allowed to accumulate hazardous waste at remote locations for up to 90 days without a RCRA permit prior to transporting the waste to a permitted TSDF. Since remote locations are often unstaffed, it can be difficult to accumulate hazardous waste and secure it against releases resulting from accidents or vandalism. Additionally, in urban "remote" locations, waste left at street access locations can disrupt normal traffic patterns. For these reasons, utilities would prefer to transport hazardous waste immediately from remote locations. However, the waste must be transported directly to a TSDF, and arranging to bring the waste directly to the TSDF can take several days, especially if the event is unplanned. Under the New York State DEC project, these utilities will be able to transport remote location hazardous waste as soon as it is collected and to consolidate wastes for up to 90 days at their designated UCCFs before it is transported to a permitted TSDF. In addition, utilities will be allowed to combine similar wastes at their UCCFs. Consolidation will result in fewer vehicle trips, with each trip carrying a larger waste load. The regulatory flexibility in this project is expected to streamline the reporting process, resulting in a reduction of duplicative paperwork, streamlined information for the public, and a creation of direct cost savings for participating utilities, EPA, and New York State DEC.

Results/Anticipated Outcomes: EPA issued a final rule in July of 1999 providing regulatory flexibility under RCRA that will allow participating New York State utilities to consolidate the hazardous waste generated at remote locations at designated UCCFs. New York State has received authority to administer most of the RCRA program and the rule will not become effective until the state adopts equivalent requirements as state law. New York State will be promulgating a specific state rule with equivalent provisions to the federal rule. The state will review and approve UCCF participation. This rule change will provide superior environmental performance and protect public health by facilitating the removal and consolidation of hazardous wastes at remote locations. Under the rule, hazardous waste will be transported to a UCCF within a utility right-of-way network immediately after collection or when the staff collecting the waste leave the location, whichever occurs first.

Under the New York State DEC project, each participating utility is required to reinvest one-third of its direct cost savings into environmental remediation or pollution prevention activities that go beyond what is legally required and that were not planned prior to participation in the project. In their annual progress reports, participating utilities will be required to identify the monetary value of the direct cost savings they have experienced as a result of the project as well as the environmental activities in which they are investing.

Transferability: The New York project seeks to enable innovative waste handling practices to safely and effectively deal with the problems associated with the generation of hazardous wastes at remote locations. These new practices can benefit utilities across the country facing similar problems with the remote generation, transportation, and secure accumulation of hazardous wastes. This project provides the opportunity to examine (1) if immediate transport of hazardous waste to central collection facilities reduces accidental releases and risks to human health and the environment, (2) whether the

reinvestment of direct cost savings creates better environmental protection than current regulations, (3) the effectiveness of a regulatory flexibility approach that extends across industry sectors within a state, and (4) the realized time and cost benefits of the consolidation approach. EPA is currently considering whether alternative manifest standards for consolidating wastes from remote utility generation sites are appropriate on a national scale. This project is helping to inform that process.

RCRA Performance-based Environmental Management Standard

The Experiment(s): The New England Universities Laboratories project proposes to test the effectiveness of an integrated, flexible, performance-based system (i.e., an environmental management standard) for managing laboratory waste, including RCRA hazardous wastes, in laboratories. This project will examine this alternative approach to hazardous waste management to demonstrate that it is more systematic, more centralized, and more environmentally beneficial than the approach currently being used by these universities. At the same time, the project will try to integrate some of the current RCRA hazardous waste regulations with current Occupational Safety and Health Administration (OSHA) regulations. This will be accomplished by developing a RCRA-based Environmental Management Plan (EMP) similar to the OSHA-required Chemical Hygiene Plan (CHP) at each university. Three universities are participating: University of Massachusetts-Boston, Boston College, and University of Vermont-Burlington. The laboratory EMP will establish the parameters for meeting the minimum requirements for handling wastes at each individual laboratory. The EMP is the mechanism through which the more general Environmental Management Standards (EMS) will be put into practice at each university. These laboratory EMSs include provisions similar to those required for compliance with the International Organization of Standards (ISO) 14001 Environmental Management System.

The three New England universities' laboratories want to experiment with a Laboratory EMS approach because it provides a means for comprehensively managing all laboratory hazardous wastes. It is through the Laboratory EMP that the universities will have the opportunity, and the obligation, to create a performance-based EMS. This comprehensive environmental management approach will complement their OSHA requirements, encourage waste minimization, and stimulate the redistribution and reuse of laboratory waste within each university.

Results/Anticipated Outcomes: The New England Universities Laboratories project provides the participating universities a temporary conditional deferral from two specific RCRA regulations (Hazardous Waste Determination and the Satellite Accumulation Provisions). These RCRA regulations have been identified by the universities as impediments to a more efficient and effective laboratory waste management system. This deferral is based on the universities' compliance with the Laboratory EMP and minimum performance criteria set forth in the site-specific RCRA rule.

This project is expected to achieve superior environmental performance by setting ambitious goals for the universities (i.e., 10 percent reduction in hazardous waste generation and a 20 percent increase in the reuse of laboratory wastes). This effort will include the creation of a comprehensive management system for achieving these goals through better tracking and control of the hazardous waste, improved coordination of RCRA and OSHA regulatory compliance, and a streamlined process for increasing regulatory compliance within the universities. In this project, the requirement to define and implement laboratory waste management policies and procedures will effectively manage laboratory waste at every stage of its handling and disposition. Full compliance with RCRA requirements is required once laboratory waste is received at the on-site hazardous waste accumulation area(s).

Environmental benefits also will result from increased environmental awareness. Training, defined policies and procedures, enhanced audit programs, and pollution prevention strategies are key management elements. One element of the Laboratory EMP requires each university to define a list of "hazardous chemicals of concern" and annually conduct a risk assessment survey of these

chemicals in the laboratory. This documented assessment will enhance both waste and risk minimization efforts and move laboratory personnel/inspectors away from discussions over whether a hazardous material on the shelf is a RCRA hazardous waste.

Transferability: The Laboratory EMS is designed to offer a potential RCRA waste management approach for research and teaching institutions. The long-term vision of the participating universities in proposing the laboratory standard is that, by streamlining and coordinating the RCRA and OSHA regulatory programs, an integrated and transferable Laboratory EMS will allow scientists and researchers who move from one institution to another (or temporarily perform research on a sabbatical at a different institution) to be subject to and familiar with a consistent approach. The search for an alternative regulatory system for managing hazardous wastes in laboratories is currently being discussed in California, North Carolina, and other states and regions of the country. Minnesota has expressed interest in testing this Laboratory EMS and other research organizations have expressed interest in becoming "second-tier adopters."

Since Massachusetts and Vermont have been authorized to administer most of the RCRA program in lieu of the Federal program, this rule will not take effect until both states adopt the requirements as state law. Each state has begun the process of incorporating this new regulation into their authorized programs while the universities are in the process of developing their EMPs.

All three New England universities participating in this project and implementing Laboratory EMPs are members of the Campus Consortium for Environmental Excellence (C2E2), which originated in the New England geographic region. The lessons learned from these pilots could be transferable to other C2E2 members. If results indicate success, the sharing of information and resources from these pilots will not be limited to the New England geographic area, however, and are expected to be transferable to other academic institutions, hospitals, and corporations with extensive laboratory efforts. The types of information and resource sharing that is envisioned include (1) developing educational and training materials for laboratory workers, (2) sharing information about managing and environmental performance monitoring for laboratories, and (3) integrating environmental management with laboratory health and safety practices.

RCRA Streamlining—Delistings and Variances

The Experiment(s): Under RCRA regulations, regulated entities may petition the Agency to exempt or exclude materials from being classified as a solid or hazardous waste. Two of the RCRA procedures being tested in the HADCO and Molex projects are, respectively, conditional delistings and solid waste variances. *Delisting* is a form of relief for generators and handlers of listed wastes with low concentrations of hazardous constituents. Through a site-specific process, a waste handler can submit to an EPA region or state a petition demonstrating that even though a particular waste stream (generated at its facility) is a listed hazardous waste, it does not pose a sufficient hazard to merit RCRA regulation.

Generators, owners, and operators of hazardous waste management facilities also may petition EPA for a *variance* from their wastes being classified as a solid and hazardous waste. The Agency may determine on a case-by-case basis that certain materials should not be classified as a solid or hazardous waste.

HADCO is examining ways to overcome barriers to the recovery of metals that are associated with sludge waste. There are three HADCO facilities in two different states—New York and New Hampshire—currently involved in the project. The HADCO project tests various aspects of hazardous materials recycling. Transporting hazardous waste sludges off-site is costly and there are risks inherent in their long-distance transport. On-site recycling of some of these materials may be economically feasible. The HADCO project addresses three different waste recycling and reduction questions: (1) Can F006 RCRA wastes be safely recycled by primary metals smelters or other appropriate metal reclamation facilities? (2) Is it possible to recycle copper dusts, a current by-product of HADCO operations that is being sent to a

landfill? (3) Does the installation of sludge dryers safely and economically reduce the volume of sludge wastes? The HADCO project hopes to demonstrate that new regulatory approaches to safely handling sludge can favor recycling certain wastes throughout the printed wiring board industry.

Molex has upgraded the wastewater treatment system at its Lincoln, Nebraska, facility to optimize the recovery of metals used in its electroplating processes. This is being accomplished through use of a segregated treatment system for nickel, copper, and tin/lead wastestreams. EPA and Nebraska issued Molex a temporary variance from hazardous waste regulations based on the company's agreement to (1) routinely collect environmental data on the waste sludges and wastewater effluent and (2) collect appropriate cost information associated with the operation of the segregated treatment system and sludge handling activities. Obtaining the temporary variance classifies its segregated process sludge as a "commodity-like" material rather than as a hazardous waste, allowing Molex to change not only the method of shipping (to common carriers from hazardous waste haulers subject to RCRA regulations), but also the shipping frequency (on an as-needed basis rather than every 90 days as required for hazardous waste).

Results/Anticipated Outcomes: HADCO will measure the benefits of its copper recycling experiments by estimating the reduction of air emissions associated with their truck shipments of sludge wastes. The company hopes to reduce annual fuel usage by 75 percent once regulatory relief is provided. In its 2000 annual report, HADCO submitted data developed from F006 sludge shipments from 1995 through 1999, in addition to data analyses and estimates of additional parameters for the same period. Once regulatory relief is provided, HADCO will begin documenting progress in meeting its fuel reduction goal in its annual reports. The company's annual goal is to reduce by 75 percent its air emissions based on F006 sludge shipment records from 1995 through 1999. HADCO's future annual reports will describe its progress on meeting this goal once regulatory relief is secured. Similarly, HADCO expects to include in future annual reports the project-related savings from the reclamation of its copper drilling, sawing, and edging dusts, as well as from the reduction in copper use throughout the facility. HADCO installed one sludge dryer in its Derry, New Hampshire, facility, and the company's goal is to reduce the sludge from this facility by 40 percent. HADCO will describe the utility of the sludge dryer installation in future annual reports and discuss the feasibility of installing dryers in other New Hampshire facilities.

The Molex project has been in implementation since August 1998. Molex intends to document superior environmental performance by demonstrating that (1) its segregated waste treatment system is technically feasible, (2) through greater metals recovery the environment will benefit from a reduction of the amount of metals discharged to the community's publicly owned treatment works (POTW), and (3) a greater quantity of wastewater treatment sludges can be recycled or reclaimed.

In its baseline report, Molex estimated that it would be able to recycle 71,328 pounds of metals sludges in a year. However, in the first three quarters of 2000, a total of 86,302 pounds of sludge have been sent to the recycler, a 21 percent increase over the baseline estimate. Based on the 2000 quarterly reports, the segregated treatment system has resulted in:

- a 65 percent reduction in the concentration of total metals in the effluent discharged by the POTW;
- decreased copper concentrations in the POTW's effluent by 81 percent;
- decreased nickel concentrations in the POTW's effluent by 80 percent; and
- decreased concentrations of tin (98 percent) and lead (3 percent) in the effluent being discharged.

Transferability: By offering regulatory flexibility to HADCO and Molex, EPA and the states of New York, New Hampshire, and Nebraska are able to evaluate the effectiveness of offering a conditional delisting or solid waste variance for RCRA-listed wastes so as to encourage metals recycling and reduce solid waste generation. Many printing wiring board manufacturers face environmental prob-

lems similar to HADCO, and the results of this experiment may offer some data on how these problems may be addressed at other facilities.

The Molex project expects to reduce metals' loadings in its effluent discharges to the Lincoln, Nebraska, POTW by at least 50 percent. This goal should provide a benchmark against which other potential requests for temporary variances may be measured. Fundamental to both of these projects will be the environmental and economic feasibility of these alternative compliance strategies. It must be demonstrated that these regulatory flexibilities not only cause no adverse environmental impact but also, in fact, offer significant environmental benefits.

Process Exemption—Innovative Copper Metallization

The Experiment(s): The technologically dynamic life cycle of semiconductor chip manufacturing has led to a rapid evolution of manufacturing process technologies. IBM's semiconductor manufacturing facility in Burlington, Vermont, has developed and introduced a new, innovative copper metallization step into the chip manufacturing process that uses a copper plating process to deposit a layer of metal on the wafer. This process replaces the Aluminum Chemical Vapor Deposition process, a dry process used for the current generation of semiconductor device technologies. IBM's new metallization step adds 400 gallons per day of copper plating rinsewater (present generation rate, rising to approximately 3,000 gallons per day in 2002) to all other process wastewaters (approximately 4.1 million gallons) generated at the Burlington facility. Prior to implementation of this new metallization step, these other process wastewaters were not regulated as a hazardous waste under RCRA.

Commingling of the copper plating rinsewater with all other wastewaters has required that the Burlington facility classify all sludge generated by the wastewater treatment process (3 tons per day) as an F006 hazardous waste, even though the copper plating rinsewater negligibly changes pollutant concentrations in the sludge. Additionally, copper is not one of the materials listed as the basis for F006 classification. Current RCRA regulations state that wastewater treatment sludges from electroplating operations are F006 wastes, and this new plating process meets the narrative description of electroplating. Rather than pursue delisting of the wastewater treatment sludge, IBM Vermont sought a site-specific process exemption from a F006 listing for its copper plating rinsewater and resultant treatment sludge. This exemption removes an "upstream" manufacturing process (copper metallization) from EPA's definition of an electroplating operation as the newer process is considerably different from the electroplating that was performed when the regulation was conceived. Specifically, this process does not involve plating baths of thousands of gallons of water that can result in large amounts of toxic metals in wastewater treatment sludges, but instead uses only 40 gallons of plating bath for several wafers.

Results/Anticipated Outcomes: While the IBM Vermont project is early in implementation, this new plating process has been developed to maximize efficient use of copper while minimizing the release of copper into the wastewater treatment system. IBM Vermont has conducted analyses of the plating bath and rinsewater that showed no presence of any RCRA materials of concern. The copper metallization process is approximately 30 to 40 percent more energy efficient than the previous generation process, producing a chip that is approximately 25 percent more efficient than its predecessor. In addition, by replacing the aluminum chemical deposition vapor process, use of perfluorinated compounds (PFCs)—greenhouse gases—will be greatly reduced, eliminating the emission of 10,000 metric tons of carbon equivalent. (Use of PFC will not be completely eliminated however; the nature of semiconductor manufacturing still creates a need for some vapor deposition of aluminum.) IBM has also committed to additional, voluntary greenhouse gas emission reductions of 40 percent from the 1995 baseline as part of this project.

Due to reclassification of its wastewater treatment sludge, IBM's reported hazardous waste production has increased by 170 percent per year, from 2.14 million pounds to 5.78 million pounds (1999 totals), and waste management costs have increased by approximately $3,500 per year. The

State of Vermont has also waived its hazardous waste tax, saving IBM $225,000 per year. This waiver will be made permanent by a rule change. In addition, conversion to the copper metallization process is expected to result in operational savings up to $200,000 per year. As the classification of the wastewater treatment sludge as an F006 hazardous waste has created only limited additional costs, the facility has been provided with little economic incentive to install a cost-prohibitive segregated treatment system that would prevent mixing of plating rinsewaters with general treatment system influent. However, removal of F006 listing from the wastewater sludge for this project will afford IBM Vermont the potential to investigate opportunities to recycle the sludge for other uses.

Transferability: IBM's copper metallization process could have application in other chip manufacturing facilities that are seeking to attain more efficient production methods while reducing waste generation per unit output. By focusing on the production (copper metallization process) side, this project also offers EPA an opportunity to test a different approach in determining whether "downstream" treatment waste resulting from a new "upstream" process should be subject to hazardous waste listings.

Water Regulations

Publicly owned treatment works (POTWs) that have mastered the programmatic aspects of the industrial pretreatment program (identifying users, permitting, monitoring) are seeking to move toward more performance-based environmental processes. Some POTWs want to make decisions on allocating resources based on the risk associated with the industrial contributions they receive along with other factors. Others want to be able to focus more resources on ambient monitoring in their receiving waters and/or to integrate their pretreatment programs with other environmental monitoring programs. In general, POTWs want the opportunity to redirect limited resources toward activities that they believe can produce greater environmental benefits. A performance-based pretreatment program pilot can allow experimentation with certain programmatic requirements of POTWs' approved Pretreatment Program. This flexibility will enable POTWs to shift resources toward innovative activities likely to yield superior environmental results.

Project XL is sponsoring a series of projects involving POTWs. While each project investigates unique innovations, they all offer EPA the prospect for improving the pretreatment program as a whole.

Table 4: Water Regulatory Innovations

Project(s)	Innovation
Albuquerque POTW	*Integrating Pollution Prevention into Pretreatment:* Resource reapportionment toward pollution prevention outreach and implementation at 25 new industrial users a year; reduce or stabilize 13 water pollutants of concern as well as mass and concentration loadings of influent, effluent, and biosolids.
Denton POTW	*Remote Monitoring and Watershed Protection:* Reduced monitoring and annual inspections while having greater focus on pollutants in urban stormwater drainage. Resource savings from regulatory flexibility reapportioned to watershed protection activities.
Louisville-Jefferson County POTW	*Watershed-based Pretreatment Management:* Three-phase project that will reallocate pretreatment resources to develop a more holistic watershed protection approach. The FPA describes project Phases I and II and will allow implementation of a third phase.
Steele County	*Mass-based Compliance Standard:* Replace concentration-based categorical limits with mass-based limits to help achieve overall industrial water reduction goals.
Steele County	*Reduced Monitoring for Regulated Pollutants Not Present:* Reduced or eliminated monitoring for regulated categorical pollutants not present in a facility's discharge.

They all test alternative methods for protecting the environment and better ways to maintain healthy waterways.

Integrating Pollution Prevention into Pretreatment

The Experiment(s): The City of Albuquerque (New Mexico) POTW project aims to reduce the amount of water pollutant loadings from business and industry in the city by integrating pollution prevention activities with Albuquerque POTW's existing Industrial Pretreatment Program (IPP). This will be achieved by shifting resources from currently required IPP activities and requirements. Albuquerque POTW's current pollution prevention outreach efforts will be expanded through various methods and will be guided by new sampling and monitoring of sewer system sub-basin manhole locations. Sub-basin monitoring will investigate the feasibility of detecting where in the city certain pollutants of concern are most prevalent. The Albuquerque POTW project will create a baseline from which a pollution prevention program can be customized to meet the requirements of an area. Sub-basin monitoring is a change from the current system of sampling influent at the POTW and deducing the upstream source(s). The monitoring information will be used to target the development and promotion of pollution prevention outreach material at appropriate locations and businesses within the sub-basin(s) of the city.

Results/Anticipated Outcomes: The Albuquerque POTW project seeks to optimize its resources to achieve institutional integration of pollution prevention into its National Pollutant Discharge Elimination System (NPDES) pretreatment program. The project commits Albuquerque POTW to pursuing reduction or stabilization of 13 water pollutants of concern. To achieve these goals, Albuquerque POTW will look to implement pollution prevention at a targeted 25 new businesses a year.

Pollutant reductions will be guided by sewer sub-basin monitoring to determine where certain pollutants of concern predominate. Actual pollutant levels will be monitored in the sub-basins before pollution prevention outreach and implementation occurs. Once the monitoring baseline is established, certain sub-basins could receive more focused and intense pollution prevention outreach efforts depending on the type and amount of pollutants identified. This is expected to result in an eventual stabilization and/or decline of targeted pollutants of concern, reducing targeted pollutants by 10 to 20 percent over time.

Transferability: The materials, methods, and lessons learned from pollution prevention approaches in the Albuquerque POTW project could be transferable and serve as a model for other cities. Given the ability to shift resources to support such activities, sewer sub-basin monitoring could also be transferred to other POTWs. Sub-basin monitoring has the potential to provide focus to broader commercial and residential sectors. This project provides an opportunity to evaluate the benefits and obstacles of directing pollution prevention outreach materials at specific locations and businesses.

Remote Monitoring and Watershed Protection

The Experiment(s): The Denton POTW project is using regulatory flexibility to begin development of a watershed protection program for the Pecan Creek. The City of Denton, Texas, (Denton POTW) will receive flexibility from the Pretreatment Program to modify its annual industrial user inspection and monitoring schedule for individually approved facilities and focus on pollutants in urban stormwater drainage. Saved resources due to this flexibility will be reapportioned to site-specific watershed protection activities, including developing buffer zones along underdeveloped areas in the watershed and establishing a remote creek monitoring network integrated with a local flash flood warning system. This remote monitoring network, being developed in partnership with the University of North Texas, will transmit real-time water quality data from automated, remote monitoring stations located up- and downstream from the POTW.

Denton POTW plans to create an administrative mechanism to allow buffer zone creation in underdeveloped drainage basins of watersheds lying within the Denton boundary. These easements, which Denton POTW hopes to establish at a minimum of 50 feet, will create a network of vegeta-

tion that should result in the reduction of suspended solids, nitrogen and phosphorous fertilizers, pesticides, and herbicides.

Results/Anticipated Outcomes: The Denton POTW project tests the application and development of technological methods to achieve stormwater and watershed monitoring requirements with minimal personnel demand. The project will focus on establishing baseline ambient conditions of Pecan Creek with monitoring designed to assess the impact of pollution control measures.

The Denton POTW will assess the impact of its efforts to control stormwater runoff and pollution using elements of the State of Texas' Receiving Water Assessment and Clean Rivers Program. Water quality and aesthetic indicators will be used to measure the effectiveness of all proposed watershed protection activities.

Transferability: This project will test the application and development of technological methods to monitor a watershed that creates minimal demand on personnel. The use of technology (remote monitoring) to accomplish tasks that would otherwise require extensive staff demand could serve as a model for other POTWs looking for innovative watershed protection approaches.

Watershed-based Pretreatment Management

The Experiment(s): The Louisville and Jefferson County Metropolitan Sewer District (MSD) wants to more effectively manage its local pretreatment program and establish links between other District wastewater programs (e.g., stormwater). This will move MSD toward a more holistic watershed protection strategy for the Chenoweth Run watershed. The MSD project will move forward in three phases: (1) data collection and development of pretreatment performance measures, (2) pretreatment program redesign to reduce key pollutants and identify areas of resource inefficiency, and (3) new program implementation to reduce mass loadings. Phase I of the project was cemented in a Phase I agreement. Phase II is described in greater detail in the FPA. Phase III is intended to result in resource savings that MSD can shift to pollution prevention outreach activities, first within the pretreatment program and then in other watershed based programs.

Results/Anticipated Outcomes: The MSD project has proposed to better manage the Jeffersontown POTW's pretreatment program through a holistic watershed approach. In Phase I, MSD collected supplemental and improved data from "strategic" points in the sewer collection system. These data, combined with existing pollutant data, enabled MSD to establish a baseline for pollutant loadings. With this baseline established, MSD will develop loading projections and reductions, performance measures, and new pretreatment program elements.

MSD has already realized benefits from meaningful data and better coordination of information. MSD expects to realize further benefits through enhanced response to wastewater treatment plant upsets, reapportioning monies that would have been spent on permitting and monitoring to pollution prevention projects within the watershed. These projects are intended to maintain or decrease loadings of certain pollutants within the watershed.

MSD is also committing to continue its monitoring of the Chenoweth Run watershed for pollutants of concern, developing agreements with eligible industry for pollution prevention projects, and conducting assessments of pretreatment program performance against performance measures. The FPA specifies performance measures for pollutants of concern to be a percentage reduction below water quality criteria, local NPDES permits limits, and biosolids disposal criteria.

Transferability: Once this new program is fully underway, other municipalities could draw important lessons from MSD's experience in developing and implementing a performance-based, and ultimately holistic watershed protection strategy. Also, co-regulators (states, tribes, and EPA) have the opportunity to analyze the challenges posed by a regulatory structure that does not integrate programs and to find solutions with more holistic approaches.

Mass-based Compliance Standard

The Experiment(s): The Steele County project sponsors are pursuing a community-wide project to address industrial wastewater effluent reductions in two municipalities, Owatonna and Blooming Prairie, Minnesota. The project sponsors are a collection of local industrial users, primarily metal

finishing facilities, that will commit to a cumulative reduction of some regulated wastewater effluents while reducing overall water usage.

One project goal is to facilitate water conservation measures at sponsor facilities. To effectively institute such measures, sponsors in Owatonna sought regulatory flexibility to express concentration-based pretreatment categorical limits with mass-based limits. The CWA's National Pretreatment Standards establish limits on pollutants in specific industrial categories. The standards establish pollutant limitations in different ways for different categories. The Owatonna sponsor facilities are currently operating under concentration-based standards. Current regulations do not allow alternative mass-based limits to be substituted for a concentration-based limit when the applicable standard is expressed in terms of concentration. This lack of flexibility can cause obstacles for industrial users that are attempting to reduce or minimize water use. By reducing volume, water conservation can increase the concentration of pollutants, even if the total mass of pollutants has decreased. A facility that has cut its water use might exceed its concentration-based limit despite having reduced pollutants in its discharge. By complying with a mass-based limit that is equivalent to or less than the total pollutant load from a concentration limit, pollutant loading would be unchanged or reduced, even though effluent concentration might have increased. Through the Steele County project, the local POTW is able to allow sponsor facilities in Owatonna to use mass-based limits in lieu of concentration limits for discharges to the wastewater treatment facility.

Sponsor facilities will also pursue wastewater effluent reductions that are greater than what is achieved under current regulations. The sponsors in Owatonna, a group of small-to-medium sized facilities, have made a voluntary commitment to a 20 percent reduction in the discharge of each of four priority metals (chromium, copper, nickel, zinc). The sponsor facility in Blooming Prairie has made a voluntary commitment to a 20 percent reduction in biological oxygen demand (BOD), total suspended solids (TSS), and total Kjeldahl Nitrogen (TKN) that flow to the local POTW. If these discharge reductions goals are met, sponsor facilities could receive flexibility in the form of reduced monitoring frequency.

Results/Anticipated Outcomes: In return for the equivalent mass-based limit flexibility, Owatonna sponsor facilities have committed to a goal of reducing the total amount of water flowing from sponsor facilities to the wastewater treatment facility by 10 percent over the course of the project. Regulatory limits for industrial discharges from the sponsor facilities will remain in effect, but these limits will be changed from concentration-based to equivalent mass-based limits. Any exceedance of a mass-based limit could result in the use of a traditional enforcement tool. To ensure the appropriateness of the mass-based limits, sponsor facilities will be required to notify the POTW in the event that production rates vary, impacting mass loading.

For the Owatonna sponsor facilities, if the metal discharge goals are met, the POTW would have the option to reduce the frequency of monitoring from quarterly to biannual monitoring for facilities with satisfactory compliance records. For the Blooming Prairie sponsor facility, if the effluent discharge goals are met, the frequency of monitoring for BOD, TSS, and TKN could change from a weekly requirement to a bimonthly schedule.

Transferability: The Steele County project will serve as a test case for the use of equivalent mass-based limits as an alternative to concentration-based limits. As more industries and municipalities institute water conservation practices due to supply constraints, environmental conditions, or costs, the mass-based limit option has the potential to be transferred to facilities heavily dependent on water who are operating under a concentration-based categorical pretreatment standard.

EPA is currently considering allowing POTWs to set equivalent mass-based limits as an alternative to concentration limits to meet concentration-based categorical pretreatment standards on a national scale through the proposed rule Streamlining the General Pretreatment Regulations for Existing and New Sources of Pollution (July 22, 1999 64FR39564). The Steele County project is helping to provide information. It is also helping to determine whether providing mass-based limit flexibility prior to implementation of water conservation efforts will encourage more widespread adoption of such practices.

Reduced or Eliminated Monitoring for Regulated Pollutants Not Present

The Experiment(s): Steele County project sponsors in Owatonna may be provided flexibility by the local POTW to allow them to reduce or eliminate monitoring for any pollutant regulated by a categorical pretreatment standard if that pollutant is not present in the facility's discharge. Under current regulations, industrial users subject to categorical pretreatment standards are required to submit reports at least twice a year to their Control Authority indicating the nature and concentration of all pollutants limited by the standards. (For most municipalities, as for Owatonna, the Control Authority is the local POTW). In addition, the local POTWs must sample facility sponsors at least annually for all regulated pollutants. This sampling is required for all pollutants limited by a categorical standard, even if the pollutants are not reasonably expected to be present in the effluent.

Under the Steele County project, the local POTW will be able to modify an industrial user's permit to reduce or eliminate sampling for regulated pollutants not discharged by the sponsor facility based on three years of sponsor effluent data. This flexibility will apply to any categorical pollutants that are not expected to be present in the waste stream at levels greater than background in the water supply, with no increase in the pollutant due to the industrial user's activities.[4]

Results/Anticipated Outcomes: The Steele County project gives the participating POTWs the flexibility to allow facility sponsors to eliminate or reduce monitoring. This determination will be based on both sampling data and other technical data (raw material usage, industrial processes and potential process byproducts). Existing data on pollutant concentrations in the local public water supply will help characterize background concentrations. If a sponsor facility uses an alternative water supply, representative sampling will be needed to characterize background pollutant concentrations from the alternative influent. At least three years of facility sponsor effluent data will then be compared to the background data in making the determination that a given pollutant is not expected to be present. This determination will also be based on raw materials used, industrial processes and potential process byproducts. It will not consider the capability or efficiency of the sponsor facility's pretreatment system. Once the POTW determines that one or more regulated pollutants are not expected to be present at a sponsor facility, it can modify that sponsor's permit to reduce or eliminate monitoring requirements for those pollutants.

The POTW will sample and analyze the applicable sponsor for all pollutants limited by the categorical standard at least once during the term of the sponsor facility's permit. Sponsor facilities will remain subject to the categorical standards for pollutants determined not to be present and will need to resume sampling if the pollutant is found to be present at levels greater than background in the water supply. As a condition of the revised permit, sponsor facilities will be required to submit a brief certification statement that there has not been an increase of the pollutant(s) due to activities along with the standard semiannual monitoring reports.

Transferability: By testing the flexibility to waive or reduce monitoring for categorical standard pollutants not expected to be present in the waste stream, the Steele County project approach could be applied broadly by POTWs. This reduced monitoring approach was proposed as part of the July 22, 1999, proposed rule affecting the National Pretreatment Regulations.

Site Cleanup

In response to growing concern over health and environmental risks posed by hazardous waste sites, Congress established CERCLA, commonly known as Superfund, on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. By April 2000, more than 100 Superfund sites (many thought to be unusable) had already been recycled without an organized effort

[4] This flexibility will not apply to industrial users subject to the Categorical Standards for the Organic Chemicals Plastics and Synthetic Fibers point source category, 40 CFR Part 414.

Table 5: Site Cleanup Regulatory Innovations

Project(s)	Innovation
ExxonMobil	*CERCLA Streamlining to Recycle Superfund Site:* Streamlined strategy for Superfund site remediation; early consideration and planning in remediation process for site redevelopment and reuse.

on the part of EPA. The Agency is now embarking on a coordinated effort called the Superfund Site Redevelopment Initiative, begun in July, 1999, to facilitate the return of these sites to productive use. Through partnerships with states, tribes, other Federal agencies, local governments, communities, landowners, developers, and parties potentially responsible for contamination, EPA has achieved substantial results protecting public health and the environment, while piloting and experimenting with improvements to the cleanup process.

CERCLA Streamlining to Recycle Superfund Site

The Experiment(s): Proposed in September 1998, the ExxonMobil project implements a streamlined strategy to the traditional Superfund remediation approach to expedite the cleanup of the Fairmont (West Virginia) Coke Works Superfund Site (Site). To clean up the Site, ExxonMobil will be administering a series of changes to the traditional Superfund process that will affect site characterization, risk assessment, management of on-site landfills, and mitigation requirements for on-site wetlands. Although many of the administrative procedures being used in this project are available through CERCLA, concurrent use of them represents a departure from conventional cleanup actions. These changes are intended to minimize the impact of the Superfund site on human health and the environment, enabling the Site to be cleaned up in approximately half the time a normal Superfund response might take.

Site Mitigation: While maintaining protection of human health and the environment, ExxonMobil is seeking to reduce the total time involved in cleaning up the Site. Due to the specific nature of contamination at the Site, it was recommended that a non-time critical (NTC) removal action framework be used to address the remediation of process areas and waste management units at the Site. Removal actions are short-term responses to mitigate imminent threats to the public or the environment while remedial actions are longer-term cleanup actions to permanently remedy problems at a site. The NTC action will be consistent with any long-term remedial action at the Site. Other potential cleanup issues at the Site (e.g., groundwater contamination) will be addressed by the remedial action process. EPA site managers have estimated that this use of a NTC removal action will result in a faster, more efficient cleanup. ExxonMobil plans to use removal and remedial actions in a coordinated manner to reduce the total time involved in cleaning up the Site.

Site Characterization: ExxonMobil and EPA negotiated the use of an engineering evaluation/cost analysis (EE/CA) to temporarily replace a remedial investigation/ feasibility study (RI/FS).[5] The EE/CA is a flexible document tailored to identify and analyze the scope, goals, and effectiveness of the NTC removal action. The detail of the EE/CA is determined by the scope of the NTC action. Although not required by EE/CA guidance, an ecological risk assessment is being conducted on the Site.

Risk Assessment: A baseline human health risk assessment will be conducted as a required part of the EE/CA. Human health risk assessments con-

[5] Under a traditional Superfund remedial action, once a site is listed on the National Priorities List (NPL), a remedial investigation (RI) is performed to characterize the site and determine nature of the contamination. As part of the RI, a risk assessment is performed to determine baseline risk to human and environmental receptors. A feasibility study (FS) is conducted concurrently with an RI to establish remedial action objectives and evaluate all remedial alternatives in detail. In consultation with the appropriate state agency, a remediation plan is selected and documented in a Record of Decision (ROD). Remedial design (RD) technical specifications are selected based on the ROD and then the remedial action (RA) phase implements the cleanup.

ducted as part of Superfund programs have generally included an evaluation of potential risks associated with residential exposure scenarios, unless the future use of the site is commercial/industrial. The assessment of potential risk associated with direct exposure to contamination at the Site was limited to commercial/industrial exposure scenarios. The scope of risk evaluation conducted as part of the NTC removal action was between the limited risk evaluation undertaken for a time-critical removal action and the conventional risk assessment conducted for remedial actions. ExxonMobil has ownership of the property, thus it can limit the redevelopment options for the site to commercial or industrial uses through institutional controls such as deed restrictions.

Site Management: A specific area in the northern part of the Site will be designated as an area of contamination (AOC)[6] to avoid triggering a RCRA land disposal restriction (LDR) during remediation activities. Under RCRA, land disposal or placement of RCRA classified hazardous wastes without previous treatment is generally restricted. Under the AOC concept, EPA has designated activities not considered land disposal or placement. All waste management units in the northeast area of the Site will be designated as a single AOC so that on-site waste management can proceed in a regulatory compliant and efficient manner without being construed as placement or invoking an LDR. This designation is justified due to the close proximity of the waste management units.

Wetlands Mitigation: Some wetland areas (e.g., drainage channels) were formed during interim removal actions on the Site between 1993 and 1996. ExxonMobil has prepared a map identifying potential wetland areas created by the removal actions and EPA will evaluate the mapped areas and determine flexible mitigation requirements for the Site based on the following: (1) If any of the mapped wetland areas are part of existing treatment of drainage systems, no mitigation will be required. (2) In addition, if, in the process of anticipated Site cleanup, these wetland areas will be improved due to grading or reconstruction, such actions could be considered mitigation. Wetlands created during the 1993-1996 EPA removal actions not fitting the above criteria will be evaluated on a case-by-case basis.

Results/Anticipated Outcomes: ExxonMobil has mapped wetland areas created during the earlier removal actions. The mapped areas are being reviewed by EPA and the State of West Virginia. Completion of the EE/CA and NTC removal actions is expected in the coming months.

This project has been designed to achieve accelerated remediation and improved environmental protection. Coordination of removal and remedial actions by ExxonMobil will result in a more rapid progression through site characterization, remedy selection, and remediation phases without compromising the technical aspects of the Superfund program. This approach will allow the Site to be cleaned up in approximately half the time a normal Superfund response might take. As a direct result of an accelerated cleanup, control and management measures will be implemented sooner to mitigate the extent of migration of contamination. Risks to human health and the environment will be minimized or eliminated sooner due to the shorter cleanup time frame. In addition, ExxonMobil will experience a reduced administrative burden through the use of streamlined risk assessment, site characterization processes, and data submissions.

Transferability: At this stage in the project, it is too early to measure changes in environmental performance, but by examining options for streamlining the Superfund cleanup response timeline, this project can serve as a model for expeditiously and effectively cleaning up a Superfund site and facilitating its return to productive use. As the project proceeds, there will be an opportunity to analyze how streamlined risk assessment and focused site characterization can provide benefits to the community and environment and how expedited cleanup schedules can help mitigate migration of contamination and reduce or eliminate potential risks to human health and the environment.

[6] EPA defines an AOC as a non-discrete land area on which there is generally dispersed contamination. The AOC concept arose out of the EPA's definition of "land disposal" and was introduced as a tool for the management of remediation wastes. Land disposal is broadly defined to include virtually any placement of hazardous waste on the land, including temporary placement.

Permitting

EPA, state, and tribal programs require industrial and municipal facilities to obtain permits that limit their emissions and discharges to the air, land, and water. Permits, which contain detailed descriptions of proposed activity and operating procedures, are the chief vehicles through which statutes and regulations are translated into facility-level ordinances. They have been one of our most effective environmental protection tools and are the nexus at which most people first encounter the regulatory process. Permit provisions may include any combination of requirements addressing (1) limits on emissions or effluents; (2) monitoring, reporting, and recordkeeping; (3) pollution treatment or control technologies; (4) management practices; and (5) pollution prevention requirements. Permits are typically issued by states, tribes, or EPA (when a co-regulator permitting program has not yet been approved by EPA). Interested stakeholders are encouraged to provide input into the permitting process during the mandated public comment opportunities.

The present system has developed into a sophisticated one that controls significant sources of pollution from industrial and municipal facilities. However, government permitting regulations reflect the single media, "command-and-control" focus of our environmental statutes. Industry, government, and community partners recognize the need to design flexible permitting approaches that are fundamentally performance-based. The essence of the performance-based approach is to shift the focus of environmental permitting toward measurement and assurance of performance, while providing flexibility in how a regulated entity meets performance standards. In theory, a system that focuses more on a facility's overall environmental impacts, and less on narrow decisions about particular technologies or process changes, should be more beneficial to the public as well as less prescriptive for the facility. Project XL experiments with approaches that apply this theory, as briefly described in Table 6.

Table 6: Permitting Innovations

Project(s)	Media	Innovation
Intel Weyerhaeuser Merck Imation	Air	*Facility-wide Permit Air Emission Caps:* Flexible use of plant site emission limits (PSEL), prevention of significant deterioration (PSD) permit, or plant-wide applicability limits (PALs); facility-wide emissions caps allow preapproval of production changes without recurring permit revisions.
Andersen	Air	*Performance-based Permitting:* Incentive-based approach to reduce VOC emissions based on per unit of production emissions limit.
Elmendorf AFB	Air	*Pollution Prevention Incentives through Title V Streamlining:* New approach to streamline Title V permit process leading to cost savings that can be applied to currently non-funded pollution prevention projects.
International Paper—EI	Water	*Tailoring NPDES Effluent Improvements:* Through use of a collaborative process, IP will replace a set of qualitative regulatory requirements—best management practices (BMPs) from the water portion of EPA's Pulp and Paper Cluster Rules—with targeted, enforceable, and quantitative NPDES permit limits
Weyerhaeuser	Water	*Water Effluent Limits:* A revised NPDES permit reflecting more stringent limits on BOD, TSS, and adsorbable organic halogens (AOX). Voluntary reductions below permit limits resulted in no fish tissue sampling or water body assimilative capacity studies.
Jack M. Berry Corporation	Multi-media	*Comprehensive Operating Permit:* Consolidate individual media permits into a multimedia all-permit reporting requirements for a facility.

Facility-wide Permit Air Emission Caps

The Experiment(s): The complexities of air regulations require a considerable effort by both regulators and facilities in their preparation and review of permit applications for many process modifications. Project XL is testing how innovations in the air permitting systems can reduce a facility's environmental impact, while streamlining the permitting process and reducing paperwork. Using facility-wide emission caps is a way to bring about such changes. Facility-wide emission caps are designed to prevent growth in discharges from both existing and future stationary sources. In general, such provisions require that any emission increase from equipment at a facility be offset by emission reductions from other equipment under the same cap. Table 7 includes the Project XL experiments with facility-wide air emission caps under the following permits: Prevention of Significant Air Quality Deterioration (PSD), New Source Review (NSR), and Title V of the Clean Air Act (CAA).

Table 7: Facilitywide Permitting in XL

Project/ Permit Type	Approach	Emission Caps
Intel New Source Review (Minor)	EPA and the State of Arizona have provided Intel with the flexibility to make equipment and process changes and construct new facilities at the site without air quality permit reviews, as long as the PSELs are not exceeded and all other FPA and permit limits are met. To provide an additional safety factor, Arizona Ambient Air Quality Guideline limits for HAPs will not be exceeded at the Intel facility property line or elsewhere on the site.	Emissions for the entire facility are capped as follows: VOCs at 40 tons per year; NO_x and CO_2 at 49 tons per year; SO_2 and particulate matter at 5 tons per year; phosphine at 4 tons per year; sulfuric acid at 9 tons per year; organic HAPs and inorganic HAPs at 10 tons per year.
Weyerhaeuser New Source Review	EPA and the State of Georgia have modified the facility's existing air quality permit to include dual emission caps for air pollutants. The dual emission caps are (1) a cap that allows the recovery furnace, smelt dissolving tank, calciner, and combination boiler (the facility's major sources emissions) to be operated to their design capacity without triggering permit review; and (2) a cap covering all facility sources except those four major sources. The modified air quality permit streamlines the permit renewal process, includes alternate excess emission reporting protocols, and includes a protocol for conducting manufacturing process experiments without triggering a permit review.	The caps reduce allowable air emissions by 60 percent. The dual emission caps apply to particulate matter, SO_2, NO_x , CO , VOCs, and total reduced sulfur (odor-causing pollutant).
Merck Prevention of Significant Air Quality Deterioration	EPA and the State of Virginia issued a new PSD air quality permit for a facility wide air emissions cap at the Merck Stonewall Plant. Under the new permit, changes or additions to facility operations that result in emission increases will no longer require prior approval under either Federal or state regulations. The new permit provides the flexibility to implement a change in operations that increases emissions within the constraints of the emission caps. In addition, Merck will have the option of reducing the facility-wide caps instead of implementing specific control technologies prescribed by certain future regulations.	The facility-wide cap limits total emissions of criteria air pollutants to levels 20 percent below baseline (i.e., prior actual emissions): SO_2 emissions to levels 25 percent below baseline levels, NO_x emissions to levels 10 percent below baseline levels, and particulate matter to levels approximately equal to baseline levels.

Table 7: Facilitywide Permitting in XL (Continued)

Project/ Permit Type	Approach	Emission Caps
Imation New Source Review	Imation will use the concept of a pollutant-specific, PAL for new source review (NSR) purposes. The PAL concept is intended to allow major sources to avoid case-by-case NSR applicability determinations. Instead, under the PAL concept, sources are allowed to make facility modifications without triggering major or minor NSR so long as their actual emissions do not exceed the PAL, which is set at a level representative of actual emissions. The existing preconstruction air permitting regulations that govern modifications at the facility, specifically the CAA minor NSR and major nonattainment NSR regulations, require that changes to Imation's manufacturing processes must be reviewed and approved in advance by the Ventura County (California) Air Pollution Control District (VCAPCD)	Imation Camarillo will be subject to a PAL (a voluntary emission cap) for VOC emissions of 150 tons per year. While providing no NSR flexibility, facility emission caps for other pollutants include: CO, 30 tons per year, NO_x, 8 tons per year; particulate matter and SO_2, less than 15 tons per year each; any individual HAP less than 10 tons per year.

Results/Anticipated Outcomes: Under Project XL's flexible approach to permitting, businesses have avoided costly production delays. They also have improved their worker health and safety standards, increased the public's access to useful environmental information, and reduced their facility's emissions to the environment:

- Since 1997, Intel's Chandler facility has remained well under its air emission caps. The facility continues to avoid millions of dollars worth of production delays by eliminating 30 to 50 permit reviews a year. Early this year, Intel announced it will build its first 300-millimeter, high-volume production manufacturing facility at Chandler. The company said it will invest $2.0 billion to build and equip the wafer fabrication facility. The company will seek this expansion under its existing air emissions cap established by Project XL in 1996.

- Merck anticipates being able to avoid millions of dollars worth of potential production delays by eliminating redundant permit reviews.

- Since 1997, the Weyerhaeuser Flint River facility has remained under its caps. In 1999 Weyerhaeuser was 33 percent under its cap for particulate matter (PM), 44 percent for total reduced sulfur, 66 percent for sulfur dioxide (SO_2), 37 percent for nitrogen oxides (NO_x), 36 percent for carbon monoxide (CO), and 61 percent for volatile organic compounds (VOCs).

- The site-specific air permit will allow Imation to avoid potentially costly delays in making changes in their existing magnetic tape manufacturing equipment and processes provided that all of their air permit conditions are satisfied and their air emissions remain below the caps. In addition to the 150 tons per year cap on VOC emissions, Imation must meet a minimum of 95 percent and 100 percent capture efficiency for organic compounds (VOCs and HAPs) emitted from coating manufacturing operations at the facility. While providing no NSR flexibility, Imation has committed to emission caps for other criteria pollutants, including NO_x, 8.34 tons per year; and CO and SO_2, less than 5 tons per year, respectively.

Transferability: By focusing on the total emissions of a facility, Project XL is testing and confirming flexible emission reduction strategies that may be both duplicated at similar facilities across the country and integrated into EPA's existing regulatory regime. These concepts have already begun to be integrated into the national regulatory system. The recent pharmaceutical MACT regulations promulgated in April 1998 have incorporated lessons learned from the Merck project, allowing the

limited preapproval of certain types of production changes without requiring permit revision for each modification. The Agency is formally considering further expanding this use of preapproval and "cap permits."

In addition, these projects are testing alternative major new source review (NSR) applicability systems that allow plantwide applicability limits (PALs) instead of traditional NSR netting for determining whether modifications are subject to major NSR. Through a proposed NSR rule, EPA would make PALs more broadly available, enabling plants to establish capped limits on their total emissions in exchange for increased flexibility to add and subtract production units without having to go through NSR and the associated permitting. This would provide communities with certainty that emissions will not increase above permitted levels. EPA is also developing guidance on flexible permitting approaches that will allow a facility to permit alternative operating scenarios, establish limits on emissions, and use other techniques to provide them with operational flexibility for the life of the permit.

Performance-based Permitting

The Experiment(s): The Andersen project establishes an innovative, incentive-based per unit emission measure intended to reduce Andersen's VOC emissions at the Bayport, Minnesota, facility. Unlike traditional permitting, the Andersen project will receive a permit that uses a combination of a plantwide VOC emissions cap and a performance ratio based on VOCs emitted per cubic feet of product shipped. Traditional regulatory approaches impose penalties for poor environmental performance but have not focused on encouraging improved performance once a facility is in compliance. The performance ratio approach will have *consequences* for poor performance like the current regulatory system and will include *rewards* for beyond compliance performance. This will provide an incentive for Andersen to continue to improve the environmental performance of its Bayport facility.

One of the means Andersen will use to achieve its reduced VOC and particulate matter emissions levels will be through the expanded use of Fibrex material. The Fibrex composite material is a combination of reclaimed sawdust and vinyl. The manufacture of Fibrex composite allows for the use of wood byproduct materials rather than virgin wood. The use of Fibrex materials is beneficial since it reduces the need for raw material and requires no wood preservation treatment, which accounts for a substantial amount of VOC air emissions from the Bayport facility. Expanded use of Fibrex composite will result in substantial reductions in the emissions of VOCs per unit of production.

In addition, Andersen wants to increase the use of its in-line waterborne treatment systems and reduce the use of solvent-based wood preservatives. The current regulatory system discourages the use of the waterborne treatment systems such that Andersen has to use a greater amount of solvent-based wood treatment. Because solvent-based treatment emits substantially more VOCs than waterborne treatment, current regulations actually cause Andersen to have greater VOC emissions at it facility. This project removes the limits on Andersen's use of its in-line waterborne treatment systems so that Andersen can make greater use of this environmentally beneficial process.

Andersen may also experiment with recycling windows as feedstock for the Fibrex process. This entails collecting old window components from buildings where replacement windows are being installed, removing the paint (some of which may contain lead), processing the lead for reuse, and using the wood as feedstock for the Fibrex processes. Andersen's goal is to manage its window take-back program without invoking RCRA treatment, storage, and disposal facility requirements.

Results/Anticipated Outcomes: The Andersen project emphasizes an incentive-based system for the reduction of Andersen's VOC emissions per unit of product produced. The cap on per unit VOC emissions will ensure that Andersen's per unit VOC emission rate does not significantly exceed their range of current actual VOC emissions per unit. The penalty limit will be set at two standard deviations above Andersen's five-year average per unit emission rate. The reason for setting the rate at two standard deviations is that the emission rate fluctuates on a daily basis depending on production need: Fibrex demand, use of waterborne treatment,

use of solvent- based treatment, and the number of painted windows ordered. This approach, which is not available under existing regulatory schemes, is intended to "lock-in" existing efficient manufacturing methods and processes while encouraging environmental efficiency and rewarding continued improvement. Andersen will use as a baseline the penalty limit (an enforceable pound per unit limit for its VOC emissions); the other performance limits and thus the performance ratio will be based on the penalty limit. Table 8 describes the various performance limits used.

Transferability: The Andersen project tests whether a tiered air emission ratio system with both rewards and penalties can provide a better incentive than traditional approaches for reducing air emissions. Specifically, EPA will gain reference data as to whether emission rates per unit of production can be used to effectively limit VOC emissions and encourage environmental efficiency.

In addition, the project will provide information on whether RCRA treatment, storage, and disposal requirements can be eliminated for companies that plan to reuse materials. This could be useful to other window manufacturing and production facilities as well as other manufacturers who are interested in reuse or product "take back."

Table 8: VOC Emission Performance Limits

Community Advisory Council (CAC) Limit	The CAC limit serves as the main limit for evaluating Andersen's ongoing performance. The CAC limit is the average of the prior five years' performance ratios and will be recalculated once every three years. It will decline if appropriate, and will increase only if the changes are approved, with concurrence of EPA and Minnesota Pollution Control Agency. If its annual performance ratio exceeds the CAC limit, Andersen will be required to provide a specific explanation of the exceedance to the CAC as well as establish an approved corrective action plan to bring the performance ratio below the limit. The CAC—a group of individuals representing local residents, employees, environmental groups, and government officials—was formed to assist Andersen in development and implementation of this project.
Enforcement Limit	A static enforcement limit for the ten-year duration of the project will be established using the initial CAC limit plus two standard deviations.
Project Limit	The project limit will be set at two standard deviations above the CAC limit. It will be the same as the enforcement limit for the first three years, but will be adjusted with the CAC limit. The project limit will never exceed the enforcement limit.
Reward Limit	This limit will be two standard deviations below the CAC limit. The reward limit will not increase and will only decline if Andersen remains below it for three consecutive years. In addition to the per unit VOC limits described above, Andersen plans to make enforceable commitments to keep its overall VOC emissions for both its Bayport facilities below 2,397 tons per year. Andersen also will maintain a VOC emission sub-limit of 96 tons per year at its as yet undeveloped West facility.

Pollution Prevention Incentives through Title V Streamlining

The Experiment(s): The Elmendorf Air Force Base (Elmendorf AFB) XL/ENVVEST[7] project tests an approach to air pollutant source permitting and administrative management for military installations. Elmendorf AFB is looking to (1) reduce air pollution through prevention at the source and (2) demonstrate the feasibility of alternative-fuel vehicles in the Anchorage, Alaska, area. Elmendorf AFB is seeking regulatory relief from its monitoring and recordkeeping requirements by streamlining its CAA Title V permit process.

Under Title V, military installations are treated as a single major emissions source, with accountability for all emission sources at the installation. The CAA requires that each installation permit not only large pollutant sources, but also a significant number of smaller sources. For Elmendorf AFB, this would involve the permitting of 106 separate sources under a Title V permit, which would create costly administrative burdens for Elmendorf and regulatory agencies. Elmendorf AFB has proposed to use the Project XL/ENVVEST process to help reduce CO emissions and to reallocate money, currently earmarked for Title V permitting requirements, into other currently non-funded pollution prevention projects. Elmendorf AFB intends to demonstrate superior environmental performance in part through the introduction of a compressed natural gas (CNG) fleet and fueling program.

Results/Anticipated Outcomes: The Elmendorf AFB project seeks to reduce air pollution loadings of CO and NO_x through pollution prevention approaches. Although the base is in CAA attainment, Anchorage, which the base borders, is currently classified as a nonattainment area for CO. The base will pursue its pollution prevention efforts through a two-fold process of regulatory flexibility.

- First, Elmendorf AFB and EPA will use the EPA policy document entitled "Major Source Determinations for Military Installations under the Air Toxics, New Source Review, and Title V Operating Permit Programs for the Clean Air Act" (Major Source Guidance). This policy document recognizes that many military installations possess characteristics warranting flexibility in CAA major source determinations. Major Source Guidance allows military installations to divide themselves into functionally distinct emitting activities. Based on a potential to emit (PTE), a select number of emissions sources on a given installation could potentially be considered major stationary sources. For Elmendorf AFB, only the central heating and power plant (CH&PP) is a major stationary source based on actual emissions of CO and NO_x.

- The second part of the regulatory flexibility will be limiting the PTE of other emissions sources on the base so they will not be considered major sources. Actual emissions from these sources are currently below major source thresholds, and the base will obtain limits on the emissions from these sources. These alternative emissions standards create enforceable standards and are a critical part of the project's permitting scheme.

These flexibilities will streamline Elmendorf AFB's Title V permit process, placing the CH&PP (and a number of other sources subject to new source performance standards) in the revised permit. This change will simplify monitoring and recordkeeping requirements and result in cost savings that will be applied to pollution prevention projects. By being able to target specific emission sources, Elmendorf AFB will be able to make more cost-effective use of its resources. Through reduced monitoring and recordkeeping, Elmendorf AFB estimates that its permit management costs will decrease by 80 percent, saving the base $1.5 million over six years. These cost savings will be redirected toward pollution prevention opportunities on the base.

One of the pollution prevention projects will be the installation of a CNG fueling station, the conversion of certain base fleet vehicles to be able to use

[7]As part of the Administration's reinvention initiative, EPA and DoD signed a Memorandum of Agreement in 1995 that established how the two agencies will interact during implementation of DoD's Environmental Investment (ENVVEST) program. The ENVVEST program emphasizes regulatory compliance through pollution prevention and provides an alternative to prescriptive regulatory requirements through a performance-based environmental management system designed to attain superior environmental results.

CNG, as well as the procurement of dedicated CNG fuel vehicles. The CNG fleet should help to reduce the levels of CO on the base and bolster Anchorage's efforts to reduce CO levels.

Transferability: The Elmendorf AFB project explores ways to alleviate regulatory burdens at federal facilities and could serve as a model for other Department of Defense (DoD) installations dealing with emissions from multiple major sources. A demonstration of achievable and superior environmental benefits could spur the transfer of similar activities to other DoD installations. In addition, the conversion to alternative fuel vehicles will assist in demonstrating the feasibility of CNG technology in Anchorage as well as the potential to transfer this technology to other installations.

Tailoring NPDES Effluent Improvements

Experiment(s): The International Paper effluent improvement (IP-EI) project in Jay, Maine, is implementing process changes to improve effluent quality at its Androscoggin mill. The IP-EI project replaces a set of qualitative regulatory requirements [best management practices (BMPs) from the water portion of EPA's Pulp and Paper Cluster Rules] with targeted, enforceable, and quantitative National Pollutant Discharge Elimination System (NPDES) permit limits for key environmental parameters. The Pulp and Paper Cluster Rules require pulp and paper facilities to develop BMPs to prevent, capture, and recover spent pulping liquor and other materials that might otherwise be discharged into the wastewater treatment process and eventually into the final effluent.

IP considers its existing practices—including existing spill prevention procedures and process control technologies—to be advanced enough to be functionally equivalent to the BMPs. In exchange for a waiver of the BMP requirements, IP is implementing a series of effluent improvement projects tailored to its Androscoggin mill operations. The improvement projects will be specifically designed to improve the mills' effluent quality for chemical oxygen demand (COD) and color. IP will also accept new NPDES permit limits for effluent discharge once the effluent improvement projects are completed. The regulatory flexibility of the IP-EI project will enable IP to reallocate estimated cost savings to select and implement effluent improvement projects at the facility.

This project will be using a collaborative process involving IP, co-regulators, and other local stakeholders to design and implement effluent projects that have the potential to yield optimum environmental benefits. The collaborative process will also be used to estimate potential pollutant reductions. This stakeholder group would then map out a phased plan for implementing projects. A list of potential effluent improvement projects to evaluate includes:

1. knot liquor recovery system;
2. pulp screening liquor recovery system;
3. pulp digester heater drains recovery;
4. complete recycle of "A" pulp mill wash waters;
5. alternative knot and screening conveyance fluid;
6. power house sump drains collection system; and
7. computerized mill sewer conductivity display.

Results/Anticipated Outcomes: At this stage in the IP-EI project, it is too early to see changes in environmental performance, but it is anticipated that implementation of these effluent improvement projects will yield greater environmental benefit for COD and color reduction than compliance with the Pulp and Paper Cluster Rule BMPs. Numeric limits will ultimately be placed in the facility-specific NPDES permit that is expected to reflect a 50 percent reduction of current discharges of several key pollutants [BOD, COD, AOX, TSS].

Transferability: The IP-EI project provides an opportunity to explore how water quality improvement projects tailored to a mill's specific operations can achieve environmental results superior to what would be attained by adherence to existing regulations. It will serve as an opportunity to gain faster familiarity with new effluent technologies that may be transferable to other mills. This project may also help to inform future Agency rulemaking as regulations are under consideration for COD and color.

Water Effluent Limits

The Experiment(s): As part of its project, Weyerhaeuser revised its Flint River Plant's NPDES permit to include more stringent effluent limits on BOD, TSS, and AOX. Weyerhaeuser has modernized several components of the pulping process, which has reduced the BOD and TSS levels in bleach plant wastewater, as well as maintained the AOX levels.

Results/Anticipated Outcomes: The company's 1998 NPDES permit was revised under the Weyerhaeuser project. Weyerhaeuser modernized several components of the pulping process and has met the more stringent effluent limits on BOD, TSS, and AOX per air-dried metric ton (ADMT) of finished product. Table 9 describes the Weyerhaeuser permit limits.

Transferability: In *Aiming for Excellence* (July 1999), EPA commits to identifying and implementing improvements within the NPDES permitting program. The Weyerhaeuser project's piloting of NPDES permit alternatives have the potential to influence Agency permitting initiatives. For example, case studies about these alternatives might prove useful in the development of permit writer training materials for any of the cross-agency permitting initiatives.

Comprehensive Operating Permit (COP)

The Experiment(s): The Berry citrus juice processing plant has been required to obtain multiple permits from multiple regulatory agencies. Air quality, water quality, and consumptive-use regulations govern the plant's boilers, feed mill dryers, drinking water, industrial wastewater, and water use operations. The Berry project intended to consolidate these individual permitting requirements into a single comprehensive operating permit (COP). The COP would have offered the opportunity for co-regulators (in this case EPA, the Florida Department of Environmental Protection, and the South Florida Water Management District) to eliminate Berry's burdensome requirements for preparing multiple permit applications on differing and sometimes conflicting schedules.

The COP would have consolidated selected operating permits and requirements, maintained all environmental standards, and committed Berry to superior environmental performance. The streamlined permitting approach was also expected to result in cost savings to the facility operator by reducing administrative burdens. In turn, Berry had agreed to invest these cost savings into the installation of updated equipment and implementation of updated procedures used in citrus processing to reduce air emissions of VOCs, SO_2, and NO_x.

Table 9: Weyerhaeuser Permit Effluent Limits

Permit Limits	Results
Discharge of 3.8 pounds of BOD per ADMT of finished product.	Reduced the amount of BOD in its effluent from a 1997 level of 3.01 pounds per ADMT to a 1998 level of 2.13 pounds per ADMT. In 1999, BOD levels in facility effluent increased to 2.83 pounds per ADMT.
Discharge of 4.09 pounds of TSS per ADMT of finished product.	Reduced the amount of TSS in bleach plant wastewater. Weyerhaeuser reduced the amount of TSS in its effluent from a 1997 level of 3.13 pounds per ADMT to a 1998 level of 2.8 pounds per ADMT. In 1999, TSS levels in facility effluent increased to 3.87 pounds per ADMT. Unreliable operation of a facility process during 1999 caused increased production of off-grade pulp, which is recycled through the pulp manufacturing process. This increased the amount of water used, effluent produced, BOD levels per ton of finished product, and TSS levels per ton of finished product.
Discharge of 0.15 kilograms of AOX per ADMT of finished product.	The AOX limit under the project is 4 percent beyond the best available technology standards proposed by EPA. AOX levels were 0.10 kilograms per ADMT in 1996, 1997, and 1998. In 1999, levels of AOX in facility effluent remained at 0.10 kilograms per ADMT.

Results/Anticipated Outcomes: During the initial phase of COP development Berry employees and the State of Florida worked together on the development of detailed work procedures. However, after the Berry project had been underway for almost a year, Cargill, Inc., (an international marketer, processor, and distributor of agricultural products) took over as the operator but not as the owner of Berry's LaBelle, Florida, facility. Although some project commitments had been met, EPA and the State of Florida chose to terminate the agreement after attempts to engage Cargill in the process failed. The COP was not submitted, and the project was terminated on June 2, 1999.

Transferability: Should an opportunity arise, Project XL could potentially test the COP concept at another facility. In March 1999, EPA approved a detailed plan for "The Next Generation in Permitting." The COP concept is an integral part of this plan and is expected to be a key concept in the Agency's ongoing permit improvement process.

Environmental Information Management and Access

Demands for high-quality and readily accessible environmental information has never been greater. To meet these needs, EPA, like many other organizations, has worked to take advantage of the opportunities created by new information technologies. This new capability brings new challenges, such as public access, information security, and protection of proprietary business information. EPA's new Office of Environmental Information, working with many different internal and external stakeholders and partners, is working to develop information-related policies and procedures that reflect the concerns of EPA managers and staff; local, state, and federal governments; tribes; the regulated community; interest groups; and the general public. As part of this national effort, Project XL is experimenting with approaches that seek to (1) improve public access to information through the Internet, (2) gain more stakeholder input into data presentation, (3) build performance-based incentives into reporting requirements, and (4) eliminate obsolete, duplicative, and unnecessary monitoring, recordkeeping, and reporting requirements from the federal, state, tribal, and local levels. Table 10 below describes the projects' environmental information innovations.

Table 10: Environmental Information Management and Access Innovations

Project(s)	Media	Innovation
Steele County	Water	*Alternative Reporting Strategy:* Alternative significant noncompliance reporting for POTWs. Qualifying pretreatment violations may be posted on Minnesota Pollution Control Agency Web site in lieu of being published in local newspaper.
Intel	Multi-media	*Internet Reporting and Stakeholder Input:* Improving public access to information; making community participation more meaningful; Project XL guide to project tracking and reporting.
Merck	Air	*Tiered Reporting:* Incentive-based reporting and record-keeping requirements determined by levels of emissions control (through a PSD permit).
Intel Merck Weyerhaeuser NYSDEC Berry	Multi-media	*Consolidated Reporting:* Reducing reporting burdens through report streamlining and consolidation; one-stop reporting.

Alternative Reporting Strategy

The Experiment(s): The first phase of the Steele County project includes flexibility for the development and implementation of an alternative significant noncompliance (SNC) reporting approach, under which qualifying violations may be posted on the Minnesota Pollution Control Agency (MPCA) Web site in lieu of being published in a local newspaper. Current pretreatment regulations require POTWs to annually publish a list of industrial users that, at any time in the previous 12 months, were in SNC. This list must be published in the largest daily newspaper published in the municipality in which the POTW is located. The purpose of this provision is to notify the public of violations and to serve as a deterrent for the industrial user to avoid noncompliance. Under the project, the Owatonna POTW will be granted the flexibility to use an alternative procedure for publishing SNC. This alternative approach would reserve annual newspaper publication for cases where that format is needed for its potentially greater effect.

Results/Anticipated Outcomes: The intent of this Web-based approach is to provide prompt and appropriate assistance for identifying and correcting violations. Violations that qualify under this alternative approach are available for a sponsor facility that is responsive, and where the violation(s) did not cause a pass-through or interference violation at the POTW. For a SNC event qualifying under this provision, a description of the event and the corrective action taken will be published on the MPCA Web site as the violation is reported. All SNC violations, whether published in a newspaper or not, would eventually be posted on the MPCA Web site. The Web site will also explain how SNC is determined and will have contact information about violations which are not SNC.

All noncompliance events will be investigated by a peer review committee established under the Steele County project. This committee would include two or three sponsor facility representatives not connected to the noncompliance event under review along with any stakeholder wishing to participate. The peer review committee would investigate noncompliance events, make recommendations and provide assistance to expedite the return to compliance. Peer review recommendations are not binding, and the city will continue to implement its Enforcement Response Plan. Newspaper publication of SNC will be used at the discretion of the Owatonna POTW, where the previously discussed criteria are met. The Owatonna POTW would continue to be required to provide newspaper publication of any violation that is not corrected within 30 calender days or that results in pass-through or interference. Sponsor facilities in Owatonna will take steps to ensure that public outreach on the availability of information regarding SNC events through this alternative publication approach is conducted.

Transferability: A Web-based, alternative SNC reporting approach could have application in other municipalities seeking to provide real-time and "meaningful" public notice of SNC events while continuing to provide a deterrent for industrial users. The Steele County project also provides an opportunity to test how a community-based approach can provide prompt and appropriate assistance in identifying and correcting violations. EPA is already contemplating opportunities to further apply this innovation under the new Performance Track program. Performance Track offers administrative streamlining benefits in the major program areas such as air, water, and waste. In addition, EPA will propose a set of changes in its regulations to accommodate Performance Track facilities, including expanding the options for POTWs to report certain compliance information through the Internet instead of through the newspaper. These changes will be formally proposed by EPA for public review and comment later this year.

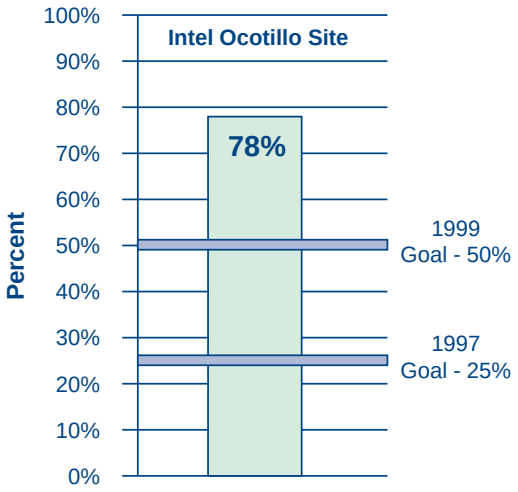
Internet Reporting and Stakeholder Input

The Experiment(s): The Intel project has two innovations designed to improve public access to information: (1) using stakeholder input to help redesign the format and content of the reports on the environmental performance of the Ocotillo semiconductor facility in Chandler, Arizona, and (2) making these reports available on the Internet. The facility's new reporting format was designed in conjunction with the stakeholder team that included EPA, the Arizona Department of Environmental Quality, the Maricopa County Bureau of Air Pollution Control, the City of Chandler, and members of

the Community Advisory Panel (CAP). Based on input from the stakeholder team, Intel agreed to put routine environmental reporting requirements and accountability measures into a single, integrated report that is publicly available on the Internet via Intel's Project XL Web site, *http://www.intel.com/intel/other/ehs/projectxl/index.htm*. Now citizens, as well as regulatory officials, can routinely monitor progress toward the facility's environmental commitments. This approach tests the value of getting comprehensive environmental information *directly from the company*. Currently, all data must be reentered, although the long-term goal is for Intel's Internet form to be merged directly into the state and local agency information systems.[8]

Results/Anticipated Outcomes: Intel established a precedent for making facility-based environmental information publicly available on the Internet. Co-regulators and public stakeholders involved with the Intel project have universally endorsed this approach. Project regulators and public stakeholders have described the report as citizen-friendly, concise, and easy to use.

Graph from Intel's 1999 Annual Report



1999 Recycled Non-Hazardous Chemical Waste

[8]"The current reporting system relies on a mix of paper forms and electronic information systems. Data originates at a facility, where it is often entered into a computer for storage. Submission of that data to a government agency, however, requires transferring it to a paper form. The agency receiving the paper report must then rekey the same data into its system to make use of it. If a state agency is the first recipient, it forwards the data to EPA, where it then must be rekeyed for use in EPA systems." From *Reporting Reform: The Case for A Joint EPA/State Strategy*, One Stop Reporting Program, April 28, 1998.

However, while it is enhancing public access to environmental performance data and the timely availability of information to the public, public stakeholders have cautioned that the Internet is not a panacea for increasing public access to information. For example, the needs of public stakeholders with limited or no access to computers must be addressed. Other projects enhancing public access in ways supported by public stakeholders include the Crompton project, which both appointed a Project XL contact at the facility to serve as a resource for the community and established public files on the project at the local library. Also, under the Weyerhaeuser project, in exchange for reducing the number of reports filed with the State of Georgia, the facility now provides information directly to the public upon request, and the facility has agreed to make even more data available than was previously reported.

Transferability: The multistakeholder input approach and the Internet access to information have proven so innovative that EPA has incorporated Intel's approach into the "Guide to Project Teams—Project Tracking and Reporting," which strongly encourages that all future projects develop similar Internet reporting formats with interested stakeholders. Also, new projects such as the Steele County project, are featuring Internet reporting innovations.

The demand for high-quality environmental data is increasing rapidly. To respond to the demand, EPA is developing a prototype system to allow data to be received and stored electronically for use by EPA, the states, and the public. This new system will allow electronic reporting instead of paper reporting, saving companies and government agencies millions of dollars. It will also centralize and integrate EPA's largest environmental databases, making information more accessible and useful. In step with the direction of this new system, the Intel project can help facility-based electronic reporting gain acceptance by other companies and regulators. Also, the stakeholder involvement approach can create an opportunity to make community participation more meaningful, e.g., by allowing firms to redesign reporting mechanisms in ways that enhance community understanding and trust.

Tiered Reporting

The Experiment(s): The Merck project provides an innovative three-tiered approach to monitoring, recordkeeping, and reporting linked to its air quality permit. A site-specific rule and new prevention of significant deterioration (PSD) permit provide alternative methods for complying with applicable state implementation plan air quality rules, NSR air emission regulations, and certain provisions of RCRA relating to air emission controls on hazardous waste equipment. The new PSD permit includes a facility-wide cap for total criteria air pollutants and subcaps for SO_2, NO_x, and PM with a diameter of less than 10 microns. The requirements for monitoring, recordkeeping, and reporting increase in stringency as the facility's actual total criteria air emissions approach the sitewide emissions cap. Annual reporting is required when facility-wide emissions are less than 75 percent of the cap. Semiannual reporting is required when facility-wide emissions are between 75 percent and 90 percent of the cap. Monthly reporting is required when emissions are equal to or greater than 90 percent of the total emissions cap. In addition, as actual emissions approach the cap, more precise monitoring methods for certain emission units, such as stack tests, must me used in place of emissions calculations based on generalized emissions factors. This provides an incentive for Merck to purchase the cleanest available technologies and to maintain low air emission levels.

Results/Anticipated Outcomes: The three-tiered monitoring, recordkeeping, and reporting requirements will become effective no later than 12 months after Merck completes the installation of new equipment that converts its coal-fired powerhouse to natural gas. This lag time is due to the fact that actual emissions will be measured using a 12-month rolling total. This total will be larger at the outset, reflecting the coal burning prior to powerhouse conversion. Powerhouse conversion is required to be completed no later than 30 months after the permit's effective date.

Transferability: Other facilities that face comparable circumstances or business issues could benefit from a similar tiered approach to monitoring, record keeping, and reporting designed to provide incentives for air pollutant emissions reductions. Once the Merck project is in full implementation, there will be a need to further evaluate (1) how useful the data are for the local, state, and Federal users; (2) what a facility must do to implement this approach; (3) whether it can be transferred into a multimedia approach; and (4) what the barriers are to broader potential implementation. This tiered provision may also have the potential to influence other Agency permitting initiatives.

Consolidated Reporting

The Experiment(s): A number of projects are testing new approaches for consolidated reporting of the environmental information required by Federal, state, and local regulations. The approaches are detailed in Table 11.

Table 11: Consolidated Reporting in XL

	Description	Programs Affected
Intel	Intel has consolidated recurring and routine reports into four quarterly reports and one annual report. The consolidated reporting format was designed in conjunction with the EPA, the Arizona Department of Environmental Quality, the Maricopa County Bureau of Air Pollution Control, the City of Chandler, and a CAP consisting of area residents.	Internet reports cover air quality, water quality, and solid and hazardous waste reporting requirements, with the exception of the Toxic Release Inventory (TRI) reports required under the Emergency Planning and Community Right-to-Know Act (EPCRA), which must be prepared and submitted separately.

Table 11: Consolidated Reporting in XL (Continued)

	Description	Programs Affected
Merck	The requirements for monitoring, record keeping, and reporting become more stringent as the facility's actual emissions approach the facility-wide cap under Merck's air quality permit. Monitoring, record keeping and reporting will be performed by Merck according to the reporting tier determined by the current 12-month rolling total. Tier I has the least stringent requirements; more frequent reporting is required when Tier II or Tier III requirements are in effect.	The tiered reporting covers air quality emissions specified by the innovative PSD permit.
Weyerhaeuser	The Weyerhaeuser project allows the facility to consolidate reporting into two annual comprehensive reports for some of the Federal, state, and local permitting and regulatory programs that apply to the facility. The reports eliminate some sampling requirements and allow annual compliance self-certification in lieu of periodic discharge monitoring reporting.	The comprehensive, less frequent reports cover drinking water, water quality discharges, groundwater and surface water use, and air quality. Self-certification covers discharge monitoring reporting for the NPDES permit.
NYSDEC	Participating utilities will produce one biennial report on all the hazardous waste generated at remote locations. Under the current system, a separate EPA identification number is assigned to each remote location reporting hazardous waste production and a biennial report must be produced for each location. This change will bring about significant reduction in paperwork and savings in time and labor, both for the public utilities and environmental regulatory agencies. The change will also provide the public with clearer and easier to use information about waste generated at remote locations.	NYSDEC will receive fewer reports with more information from participating utilities, reducing the number of reports that require separate tracking and review under the Resource Conservation and Recovery Information System.
Berry	The Berry project had been designed to have a multimedia consolidated permit in place, and the State of Florida would have allowed Berry to use nonstandard forms in reporting environmental performance.	The nonstandard forms would have applied to air quality, drinking water, industrial wastewater, groundwater monitoring, and fresh water use reporting. Also, the State of Florida may not have required Berry to provide certification of environmental reports by a professional engineer, because the COP would have been more extensive than a certified professional engineer's application.

Results/Anticipated Outcomes: The Intel and Weyerhaeuser projects' reporting mechanisms have been underway since 1997. The companies, regulators, and stakeholders involved believe that the Intel and Weyerhaeuser projects have generally resulted in detailed, value-added reporting. However, stakeholders' comfort with this approach is not absolute; e.g., one stakeholder for the Intel project wants more technical details to be available to the public, as well as the technical assistance to interpret the information, so that the community can better evaluate the potential impacts on health and the environment and then influence the company's decision-making process for

choosing among different available technologies or chemicals. This desire has been echoed by other national interests. The Merck project's reporting mechanisms are projected to start in 2001. Berry had not initiated the reporting mechanisms before that project was terminated in June 1999.

Transferability: EPA strives to reduce reporting burdens by authorizing specific reductions through recently issued rules and policies. However, the measures that EPA seeks to adopt to reduce reporting burden typically require state action in order for these reporting approaches to be achieved. A number of state programs are looking to transition to a consolidated "one-stop" reporting system. In keeping with this trend, EPA plans to further explore the Federal component of the consolidated reporting and burden reduction opportunities presented by the Intel, Merck, Weyerhaeuser, NYSDEC, and former Berry projects. EPA is already contemplating opportunities to further apply this innovation under the new Performance Track program. Performance Track offers administrative streamlining benefits in the major program areas such as air, water, and waste. In addition, EPA plans to propose a set of changes in its regulations to accommodate Performance Track facilities, including consolidated environmental reporting under various environmental statutes into a single report. These changes will be formally proposed by EPA for public review and comment later this year.

Enforcement and Compliance Assurance

One of EPA's most important responsibilities is making sure that companies and other organizations comply with the laws that protect human health and the environment. EPA and state governments have typically relied on a strong enforcement program to do this. However, EPA and states have increasingly sought to identify creative tools to help regulated entities improve day-to-day compliance and achieve performance at levels beyond compliance. For example, EPA is helping companies comply through the support of assistance centers, as well as an audit policy that encourages them to complete their own environmental evaluations.

In recent years, national efforts have centered around identifying and addressing environmental problems using innovative and integrated initiatives that combine compliance assistance, incentives, monitoring, and enforcement. These compliance incentives include incentives to self-disclose, including the audit and small business policies promoting supplemental environmental projects and providing compliance assistance through electronic centers. In particular, self-certification is being explored by states as an opportunity to deliver better compliance assurance while EPA is exploring promoting Environmental Management Systems. Self-certification approaches vary, but they typically ask facilities to report on a specified set of environmental performance measures (such as sampling actions, sampling results, regulatory compliance, and regulatory violations). States have used self-certification strategies in a variety of ways: to reduce reporting burdens, to reduce the need for resource intensive individual permits for small sources, to reduce the amount of labor-intensive inspections and/or prioritize them to allow states to reinvest resources into higher priority problems, and to increase the number of facilities addressed by states' enforcement and compliance systems. Also, states and EPA are trying new procedures to measure compliance on a facility and sector level. The measures may assist in identifying problem areas that could be improved through new technology or pollution prevention. Additionally, EPA is willing to offer flexible options under regulations that encourage facilities to choose compliance alternatives that are better economically and environmentally. Project XL has been one venue for testing these innovations, which are described below in Table 12.

Table 12: Enforcement and Compliance Assurance Innovations

Project(s)	Media	Innovation
Massachusetts DEP Weyerhaeuser	Multi-media	*Business Self-Certification:* In lieu of state permits, self-certifications are used to comply with or exceed state performance standards; Weyerhaeuser performs compliance self-certification in lieu of periodic discharge monitoring report for facility NPDES permit based on 16 years of compliance.
IP-PEM	Multi-media	*Predictive Emissions Monitoring:* Reduce the frequency of stack testing and replace a CEM system with a predictive computer-based system that will correlate operating parameters with air emissions.
Massachusetts DEP	Multi-media	*Environmental Business Practice Indicators (EBPIs):* Use of EBPIs to supplement or replace traditional measures of compliance allows regulatory agencies to review compliance as well as encourage beyond compliance techniques for industry leaders.
Merck	Air	*Alternative Compliance Flexibility under Emissions Cap:* Flexibility to reduce air emissions cap as an alternative to directly complying with newly applicable criteria pollutant regulations (through the PSD permit).

Table 12: Enforcement and Compliance Assurance Innovations (Continued)

Project(s)	Media	Innovation
Weyerhaeuser	Air	*Major Source Emissions Tiered Compliance Testing:* Modified NSR PSD permit creates a tiered compliance testing schedule based on the control of the facility's major source emissions.
Georgia-Pacific	Air	*Gasification of Pulping Liquor Under MACT II:* Pulp and paper mill is seeking to demonstrate a new recovery technology under section 112 of the CAA

Business Self-Certification

The Experiment(s): The Massachusetts Department of Environmental Protection (Massachusetts DEP) established its Environmental Results Program (ERP) on a basic premise—a primary reason for noncompliance is a lack of knowledge and understanding of the rules (including permit requirements). ERP is a multimedia, whole sector-based regulatory system that replaces case-by-case permits with industry-wide environmental performance standards and an annual certification of compliance. The ERP approach offers a multimedia summary of all applicable regulations and makes a facility manager personally responsible for compliance. It provides a simple but comprehensive checklist as part of its self-certification package and encourages a facility manager to use the checklist as a tool for maintaining compliance. ERP is a mandatory program for the three identified small-business sectors (printers, photo processors, dry cleaners) currently participating. ERP focuses in large part on corporate accountability and self-evaluation with companies required to meet and certify their compliance with industry-wide performance standards mutually agreed upon by regulators and industry. These sector-specific performance standards emphasize pollution prevention practices and principles to yield environmental results superior to those achieved through conventional regulatory approaches. ERP provides a period of outreach assistance and training for companies on compliance and other performance standards, after which the company submits a statement certifying compliance with applicable performance standards and that compliance will be maintained for the coming year.

The ERP approach has also been designed with an emphasis on enforcement. Certification statements are signed under penalty of perjury by a facility's owner, president, CEO, or other high-ranking official. Under ERP, companies are accountable for reporting any releases or exceedances of discharge or emission standards to Massachusetts DEP. Participating firms will need to provide evidence of their good faith efforts to meet and maintain compliance with ERP standards. Violations will be reported, and a "Return to Compliance Plan" submitted to Massachusetts DEP, if any such violations are either outstanding at the time of certification or discovered thereafter. If a facility is not in compliance when it self-certifies, this Plan will identify the existing violations and specify how and when compliance will be achieved.

The ERP approach will require annual self-certification, use clear performance standards written in plain language, target compliance assistance, and emphasize pollution prevention. Key to the process of confirming company compliance as well as measuring and evaluating the environmental results of ERP will be the use of environmental business practice indicators (EBPIs). EBPIs (see page 52) are industry-specific performance measures that provide a snapshot of a facility's environmental performance. EBPIs are unique in that they include measurement of adherence to traditional regulatory standards (e.g., level of compliance with labeling, record keeping, and monitoring), as well as "beyond compliance" measures (pollution prevention and reuse/recovery activities).

The Weyerhaeuser project allows the facility to eliminate some sampling activity and to provide annual compliance self-certification in lieu of periodic discharge monitoring reporting for the NPDES permit. This limited self-certification process was allowed due to the company's 16-year history of meeting all required discharge levels combined with the project's commitment to superior environmental performance. Weyerhaeuser is still required to maintain required sampling and laboratory analysis records, and all upset, malfunction, or noncompliance reporting will continue as required by applicable regulations. These records are available upon request by regulators and the public. Weyerhaeuser will remain subject to the State of Georgia's standard enforcement protocol, as required by the state's NPDES permit program.

Results/Anticipated Outcomes: Massachusetts DEP anticipates superior environmental performance by means of converting permit requirements into industry-wide performance standards that enable facility managers to be aware of their environmental obligations before they make decisions about modifying equipment and operations. In 1995-1996, the Massachusetts DEP conducted a limited evaluation of the usefulness of company participation in the Massachusetts Printers Partnership (MP2)—a predecessor ERP program. DEP found that more than 50 percent of the participating (and certifying) MP2 facilities exhibited higher environmental performance than non-participating printers.

The ERP project has been underway since late 1996, and the results of the ERP approach and self-certification are still being evaluated. In May 2000, Massachusetts DEP presented its own preliminary assessment of the ERP program to EPA. DEP is using EBPIs, compliance inspection findings, and data reported on the self-certification forms, as well as statistical sampling techniques to measure and evaluate the environmental results of ERP. Feedback from preliminary state evaluations has been largely positive. In the fall of 1997, participating dry cleaners and photo processors completed their first annual certification. Participating printers completed their first certification in 1998. These certification statements have increased the identification and understanding of small businesses not otherwise included in a regulatory framework. Before ERP, only 10 percent of dry cleaning facilities were "in the system." By 1999, that number had increased to 95 percent. Altogether, nearly 2,400 companies representing three sectors have self-certified under the ERP since 1997. Massachusetts DEP has begun expanding this approach to two additional sectors—industrial wastewater and combustion sources (boilers)—which will significantly increase the number of Massachusetts facilities self-certifying under ERP.

Preliminary evaluation has also demonstrated that converting permit requirements into comprehensive and stringent industry/sector-wide performance standards has improved corporate accountability toward annual compliance. For 1997, 80 percent of dry cleaners and photo processors completed their certifications accurately. Ten percent of submitted certification statements have "Return to Compliance Plans" (a 10 percent compliance increase). Thirty-five percent of these Return to Compliance Plans will result in a decreased environmental impact. Massachusetts DEP has estimated that increased compliance will lead to a program-wide decrease in VOCs by 10 percent, an estimated 43 percent reduction in perchloroethylene emissions (a total of 500 tons) from Massachusetts dry cleaners each year, and a reduction in wastewater discharges of silver by 99 percent from photo processors. Increased compliance is also anticipated to yield significant reductions in the use of smog-forming solvents and alcohol used by commercial printers.

The Weyerhaeuser project's self-certification has been underway since 1997, and the company reports that it continues to meet and exceed all of the enforceable discharge levels in the NPDES permit. Weyerhaeuser's records on the required sampling and analysis are also more accessible to the public as all information is available upon request directly from the facility.

Transferability: The Massachusetts DEP and Weyerhaeuser projects are testing alternative mechanisms that enhance accountability while providing flexibility. In particular, Massachusetts DEP's ERP approach has been designed to increase sector understanding while focusing limited resources

where they will make the biggest difference (away from permitting and toward outreach for compliance assurance and technical assistance and site inspections targeted against non-reporters and violators). With Massachusetts DEP expanding this approach to other sectors, the ERP approach will continue to serve as a test bed to explore opportunities for expanding self-certification and performance standards.

The extent to which the ERP approach will prove transferable in practice will depend in large part on the ability to measure and document the anticipated results of the project. Three potential opportunities for transferability are being investigated. (1) Development of a "tool kit" and communications materials could help expand the availability of information about the benefits and limitations of the ERP program as program data become available. (2) Sectors have already expressed an interest in participating in innovative programs and could be interested in participating in a self certification program if it could provide them with reduced burdens or regulatory flexibility. (3) The concentration of large and small businesses in certain geographic regions may provide an opportunity to address sector- or place-based issues on a local level.

Predictive Emissions Monitoring

The Experiment(s): The International Paper (IP) predictive emissions monitoring (IP-PEM) project is seeking to develop, test, and implement a sophisticated, computer-based, alternative emissions monitoring system that can accurately predict pollutant emissions on a continuous basis at IP's Jay, Maine, pulp and paper mill. IP will replace stack testing and the continuous emissions monitoring (CEM) system on the mill's waste fuel incinerator (WFI) with a predictive emissions monitoring (PEM) system. The PEM system would be a computer-generated model that would predict air emissions (PM, SO_2, NO_x, CO_2, and CO) from WFI operations on a continuous basis. A PEM system would provide real-time feedback and would allow IP to make operational adjustments when predicted pollutant emissions approach permitted limits. IP is also making a voluntary commitment to maintain its emissions from the WFI at a level equal to or less than 90 percent of its license limit once the PEM system is implemented.

The IP waste fuel incinerator produces steam from the combustion of fossil fuel, wood residue, papermill sludge, and waste paper. CEM systems are required for SO_2 and NO_x emissions from the WFI, but currently, WFI PM emissions are subject only to annual stack tests. Development, testing, and implementation of a computer-generated PEM system will determine if IP can predict emissions from a complex, saturated stack on a continuous basis. Current stack testing and CEM systems are designed to record compliance and noncompliance with permit limits when a violation occurs. They do not provide an opportunity to prevent or lower emissions at the time of measurement. A successful PEM system would allow IP to be proactive, correlating the relationship between operating parameters and emissions, enabling the facility to predict emissions in advance and adjust their operations prior to exceedances actually occurring.

To fully develop the computer model, the IP-PEM project has the flexibility to allow a number of short, controlled exceedances above the current WFI emission limits to formulate the model's emission prediction capabilities. The exceedances would be needed for model development, since, unless the model was programmed to identify the operating conditions which caused an exceedance during a test, the PEM system would be unable to accurately predict such a situation should it arise during regular operations.

Results/Anticipated Outcomes: The IP-PEM project seeks to provide assurances of pollutant emissions compliance on a continuous basis. Any permitted exceedance granted for computer model development will be agreed upon beforehand and will be limited to days when the potential to exceed ambient air quality standards would be minimal. Successful development of a PEM model would provide continuous information on particulate emission rates for sources that, to date, have had no federally approved methods to monitor PM on a continuous basis from saturated stacks. If the PEM system is successful for PM, a State Implementation Plan amendment could allow the system to be

approved for continuous monitoring of all types of emissions from the WFI. A successful PEM system will optimize operational efficiency while reducing facility emissions. Traditional monitoring techniques measure emissions but do not provide information on the operational parameters that affect those emissions or information on how to reduce those emissions. The PEM system would help operators better correlate emission rates and the operational processes that effect them. The system would identify statistically significant operating parameters and use them to predict emission limits. Data from the PEM will be made available to the local public via IP's Web site.

The accuracy and precision of the PEM system will be determined through a formal validation test developed by the EPA Office of Air Quality Planning and Standards. If preliminary estimates prove accurate, transferability may prove to be no problem. Due to improved efficiency, IP is anticipating fuel savings that could surpass $200,000 per year.

Transferability: The IP-PEM project offers the potential for technology transfer to other emission sources at the IP facility as well as to other facilities. PEM systems have previously been developed for simple stacks and gas-fired boilers, but have had very limited application for complex stacks with high moisture content. This project will help demonstrate if this technology can be transferred to "complex" boilers, kilns, and incinerators. PEM systems can provide a meaningful linkage between emission rates and the operational parameters that affect them and could have application for other sources of pollution or operations seeking to optimize operation controls while reducing emissions. PEM systems-generated information can be used by operators to decrease emissions while maximizing production.

Environmental Business Practice Indicators

The Experiment(s): As part of its ERP, Massachusetts DEP has developed EBPIs, in collaboration with EPA and industry, to evaluate the performance of three industry sectors—dry cleaners, printers, and photo processors. EBPIs will play a key role in the evaluation of ERP. EBPIs are industry-specific performance measures that provide a snapshot of a facility's environmental performance. The concept is to "benchmark" facility/sector performance and potentially shift compliance assurance strategies based on how EBPIs track compliance and beyond compliance activities.

The use of EBPIs rather than traditional "single dimension" measures of compliance (e.g., in compliance, out of compliance, significant noncompliance) allows regulatory agencies not only to look at compliance more comprehensively and on an annual basis, but also to recognize and potentially encourage "beyond compliance" strategies for industry leaders. The number of EBPIs developed for each sector is different. Printers have 16 EBPI measures (including nine pollution prevention-specific measures), dry cleaners have 16 EBPI measures, and photo processors have eight EBPIs. The number is based on the complexity of the industry and the number of multimedia discharges. Currently, beyond-compliance and pollution prevention opportunities are being tracked only for printers.

Sector-specific EBPIs can serve as a validation measure for sector-wide environmental performance. Massachusetts DEP is using EBPIs, along with random inspection findings and data reported on facility's annual certification forms to measure and evaluate ERP results. In establishing a sector-specific program, Massachusetts DEP uses field data and statistical methodology to calculate an industry-wide EBPI score "before" program startup, comparing this with "after" participation scores to determine the accuracy of the certification data and to calculate an industry-wide compliance rate. Rather than inspecting each ERP facility to establish a baseline understanding of the regulated universe, the Agency has used statistics to determine the appropriate number of facilities to inspect. Inspection data from these facilities were also used to compare information supplied by those firms' annual certification forms to determine overall certification accuracy based on statistical analysis.

Results/Anticipated Outcomes: In a demonstration program under MP2 (Massachusetts Printers Partnership) in 1995-1996, Massachusetts DEP used EBPIs to evaluate the performance of the MP2. Together with key stakeholders, Massachusetts DEP identified 19 different EBPIs, including

regulatory requirements, pollution prevention techniques, and good environmental management practices for MP2 participants. DEP staff performed inspections at randomly chosen facilities both before and after program startup and used data from these inspections to calculate an industry-wide "before" EBPI score as well as two "after" scores—one for printers that joined the MP2 by certifying compliance and one for those that did not. Massachusetts DEP used these data to determine if there was a statistical difference between those printers enrolled in the MP2 as compared to those who were not. Comparing EBPI scores, Massachusetts DEP found that the scores—and hence the environmental performance—of MP2 participants were 50 percent higher than the score of the "before" sample as well as those printers not certifying for the program.

For ERP, EBPI measures include using low VOC cleanup solutions (printers), degree of silver recovery (printers and photo processors), perc recovery (dry cleaners), and other pollution prevention measures for printers. Massachusetts DEP is using EBPIs to measure and evaluate the results of the ERP approach, and while results are still forthcoming, preliminary findings have been positive. Baseline data collected during random inspections before the first round of certification has been compared to data collected during random inspections after certification and outreach under ERP. For photo processors, preliminary EBPI evaluation has revealed an increase in aggregate EBPI score from the before baseline score (5.7 to 7.1), indicating an increase in compliance for the sector. For dry cleaners, the aggregate EBPI score remained constant, but there was a statistically significant increase. Additionally, the dry cleaning sector did exhibit a small increase in aggregate score for all certification questions (not just EBPI questions) after program implementation. In addition to calculating sector-side scores, DEP has sought to measure the overall level of accuracy of the certification data by comparing data collected during random inspections after ERP certification with data presented on the certification forms of those facilities. Although compliance is a single point in time, initial analysis of dry cleaners in ERP has revealed agreement between certification forms and state inspections 76 percent of the time. By measuring compliance rates by firm, sector, media, and compliance requirement, DEP anticipates being able to focus its scarce resources for compliance assistance and inspections based on how EBPIs track sector-specific performance measures.

Transferability: Given that the EBPIs are specific to each industry, it is too early to determine broader sector-wide applicability. Nevertheless, the use of EBPIs rather than the traditional "single dimension" measures of compliance (e.g., in compliance, out of compliance, or significant noncompliance) not only allows regulatory agencies to look at compliance more comprehensively but it also offers the opportunity to recognize and potentially encourage beyond compliance techniques for industry leaders. Massachusetts DEP has already agreed to expand its ERP effort to two additional, cross-sector activities—firms discharging industrial wastewater (the industrial wastewater sector) and firms installing or modifying boilers (the combustion sector). Massachusetts DEP estimates that the addition of these new sectors could quadruple the number of Massachusetts facilities that ERP could impact. This would provide an even more comprehensive database of EBPIs and would enable further evaluation of this innovative performance measurement and tracking system.

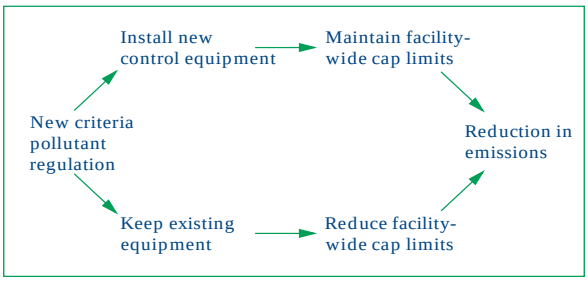
It is important to recognize that in an effort to expand the scope of measurement of sector and facility performance characteristics, new information on the sectors or facilities may be required to be generated and/or collected. The potential exists for such efforts to conflict with simultaneous efforts to reduce the amount of recordkeeping and reporting required by regulated entities. DEP's experience in this regard could prove helpful in future efforts to balance these sometimes competing goals.

Alternative Compliance Flexibility under Emissions Cap

The Experiment(s): Emissions caps provide an incentive for a site to minimize emissions to ensure compliance and to preserve a sufficient margin under the cap to accommodate growth. Merck's Stonewall Plant criteria pollutant cap has been constructed so that the facility has the ability to make many common changes at the site without prior

approval from the permitting authority. A unique aspect of this project is that Merck also has the flexibility to reduce their emissions cap instead of directly complying with a newly applicable criteria pollutant regulation. Specifically, when the Stonewall Plant becomes newly subject to a regulation, they may choose to comply with the regulation directly or reduce their criteria pollutant cap by the amount of emissions reduction expected from direct compliance. Thus, to achieve compliance with a new air pollutant regulation, the plant may install new control equipment and maintain the existing facility-wide criteria pollutant limit or they may keep the existing equipment and establish a permanent reduction in their emissions cap. Figure 1 provides a graphic depiction of this alternative compliance mechanism. Only regulations addressing one or more of the criteria pollutants covered by the emissions caps (i.e., CO, VOCs, SO_2, PM-10, and NO_x) can qualify for this alternate compliance mechanism. For example, a new rule establishing emission standards for VOCs from storage tanks would qualify; however, if the purpose of the rule was to control HAPs, alternate compliance via cap adjustment would not be available.

Figure 1: Prevention of Significant Deterioration (PSD) Permit Alternative Compliance Mechanism



Results/Anticipated Outcomes: This cap adjustment and regulatory compliance scenario is based on the premise that facilities operating under an emissions cap practice "up-front" compliance to future rules that would require emission reductions. Merck's commitment, for example, to convert the site powerhouse from burning coal to natural gas allows the facility to offer an environmental benefit in advance of any regulation. This is because the cap adjustment "locked in" a portion of the reductions from that project, preventing the site from increasing its emissions back to the cap level prior to adjustment. This approach focuses facility efforts on finding emission reductions in the most cost-effective manner, rather than attempting to achieve compliance through a generic "one size fits all" approach or the mandated installation of air pollution control equipment.

Transferability: The flexibility offered to Merck under this emissions cap adjustment scenario is related to their site-specific prevention of significant deterioration permit. Similar opportunities for flexibility under an emissions cap are possible based on site-specific conditions. Merck's ability to operate its Stonewall facility in this manner represents an approach that may be applied to other plants who are facing similar business issues.

Major Source Emissions Tiered Compliance Testing

The Experiment(s): The Weyerhaeuser project provides an alternative approach for tiered compliance testing of major source emissions under the facility's modified air quality permit. This modified permit grants compliance testing flexibility for the facility's major source emissions (generated by the power boiler, recovery boiler, smelt dissolving tank, and calciner). For these major sources at the facility, the tiered compliance testing requirements become more rigid as the major source emissions converge on the emissions limit. The four tiers of compliance testing have been established, governed by the specifications shown in Table 13.

This tiered approach provides an incentive to control major source emissions at the facility thus reducing compliance testing frequency.

Results/Anticipated Outcomes: Using this tiered performance testing approach, Weyerhaeuser has reduced costs and analyses by eliminating repetitive compliance tests for pollutants that are monitored continuously. Process improvements and energy use savings may also help further curtail boiler usage and reduce emissions, leading to a reduced compliance testing burden. Compliance testing is currently performed annually—this is due to the need to conduct testing for other pollutant emissions under the Pulp and Paper Cluster Rule—but it is expected that increased control of future emissions could lead to compliance testing every three years.

Table 13: Weyerhaeuser Tiered Compliance

Monitoring Results	Testing Frequency
When parametric monitoring has shown that control of emissions are less than 25 percent of the allowable limit	Major source compliance testing will be performed every four years
When control of emissions are greater than 25 percent and less than 50 percent of the allowable limit	Major source compliance testing will be performed every three years
When control of emissions are greater than 50 percent and less than 75 percent of the allowable limit	Major source compliance testing will be performed every two years.
When control of emissions are greater than 75 percent of the allowable limit	Major source compliance testing will be performed annually

Transferability: The opportunity to use this major source emissions compliance test flexibility was provided under the dual emission cap system incorporated into the Flint River modified air quality permit. Other facilities that face comparable circumstances could benefit from a similar compliance-based, tiered approach designed to achieve criteria pollutant emissions reductions. This provision of a facility-wide permit modification may also have the potential to influence other Agency permitting initiatives. This project will also present an opportunity to analyze how state air pollution monitoring and reporting requirements can be coordinated with federal compliance testing flexibility to ensure compliance while achieving superior environmental performance.

Gasification of Pulping Liquor Under MACT II

The Experiment(s): The Georgia-Pacific Big Island, Virginia, pulp and paper mill is seeking to demonstrate a new recovery technology under section 112 of the CAA. The Big Island facility, a semi-chemical mill, is subject to the air emissions requirements of the Pulp and Paper Cluster Rule of the CAA, which requires the installation of maximum achievable control technology (MACT). A second MACT standard (MACT II), applicable to pulp and paper mills, was proposed in 1998 specifically to address emissions from combustion sources associated with the recovery of pulping chemicals. The recovery process is an integral component of mill operations. Chemicals used in the pulping process are recovered and spent liquor organic solids are converted to energy (process steam). Currently, the mill takes spent liquor (black liquor) from wood pulping, reduces its water content through an evaporation train, and combusts the resultant concentrated liquor in two smelters (type of recovery furnace). The smelters recover sodium carbonate from a molten smelt that is then dissolved in water to produce new pulping liquor.

MACT II does not specify a particular technology to meet the emission standard. However, to comply with the proposed standard, the current Georgia-Pacific system would require a substantial upgrade. Georgia-Pacific would have to either (1) upgrade these smelters and add additional control devices or (2) replace the smelters with a new recovery boiler that uses conventional technology. As an alternative, Georgia-Pacific has proposed installing a black liquor gasification system to recover pulping chemicals. The current smelter recovery furnace would be replaced with a PulseEnhanced™ Steam-Reforming chemical recovery system.[9] Under this alternative system, organics from the concentrated spent liquor would be pyrolyzed to a hydrogen rich fuel. In turn, this fuel would be burned as an energy source for the gasification unit and as

[9]The PulseEnhanced™ Steam-Reforming gasification system was developed by StoneChem, Inc. The process produces an endothermic reaction converting black liquor organics to a gas in the absence of air or oxygen at temperatures below those required for smelt formation.

an alternative boiler fuel to produce steam used elsewhere in the Big Island facility. Sodium bicarbonate pellets would be recovered during this process for reuse in fresh pulping liquor.

Recognizing that the existing smelters would not meet the performance standard of the proposed MACT II, Georgia-Pacific sought regulatory flexibility in working to bring the gasification technology on line. Given that this technology is comparatively new, Georgia-Pacific pursued an extension to operate the existing smelters or conventional recovery boiler for a set period of time past the MACT II compliance date (once that date is established). This flexibility would provide the facility with additional time for commissioning or, in a worst case scenario, replacing a failed gasification system with a conventional recovery boiler. Georgia-Pacific also requested flexibility to use steam generated by the new process in place of steam currently generated from a natural gas boiler.

Results/Anticipated Outcomes: The final project agreement for the Georgia-Pacific project was signed on May 31, 2000. The Big Island black liquor gasification system would be the first commercial application of this innovative technology in the United States. General benefits of this gasification technology are expected to include increased energy conversion and chemical recovery efficiency, elimination of the smelt-water explosion hazard, and lower emissions of criteria pollutants (PM, SO_2, NO_x, VOCs, CO) and HAPs. Georgia-Pacific believes that use of this system will allow the Big Island facility to reduce HAP emissions below the proposed MACT II standard. Criteria pollutant emissions would also be reduced since the gasification system does not require auxiliary fuel to maintain a stable liquor combustion as opposed to a conventional recovery boiler. Such emissions reductions are attractive to pulp mills such as Big Island that use a semi-chemical non-sulfur process requiring auxiliary fossil fuel to combust black liquor.

Transferability: This project offers the opportunity to demonstrate and analyze the energy conversion, safety, and environmental performance benefits of a new technology. The Big Island mill will test the effectiveness of the PulseEnhanced™ Steam-Reforming gasification technology in providing full chemical recovery capacity for a semi-chemical mill. Other pulping facilities that face comparable circumstances could benefit from a similar approach to make their energy conversion systems more efficient and less capital intensive while achieving emissions reductions. With the Big Island facility similar in characteristic to 12 other mills in the United States, successful demonstration of this technology could contribute substantially to its transfer and implementation at a larger number of kraft mills. This technology could also have applications for the conversion of non-wood liquors, sludges, and agricultural wastes to energy.

Additionally, as the project proceeds, there will be a need to analyze the energy efficiency potential of this technology in producing steam as a byproduct of the chemical recovery process, which can be used to offset steam generated with fossil fuels.

Environmental Stewardship

Environmental stewardship is a way of identifying and pursuing good business strategies that are consistent with environmental protection: choosing environmentally benign raw materials; improving the financial and environmental efficiency of manufacturing processes; and employing effective environmental management systems (EMSs). The ultimate value of stewardship is deriving economic value from environmental excellence. Recognizing the need to promote environmental stewardship, EPA recently announced the National Environmental Performance Track to motivate and reward top environmental performance. Several states have their own programs as well. Also through Project XL, regulated facilities can further their commitment to stewardship approaches with pollution prevention, recycling, and EMSs.

Table 14: Environmental Stewardship Innovations

Project	Media	Innovation
Weyerhaeuser Berry	Multi-media	*Linking EMSs to Standard Operating Procedures:* Link EMSs to facility standard operating procedures improving environmental performance.
Lucent	Multi-media	*Multi-facility EMSs:* Develop a company-wide EMS model that could be used at multi-facilities and involves stakeholders in the development process.
Crompton	Multi-media	*Waste Minimization and Pollution Prevention Assessment:* Facility based reviews that inventory and suggest process-level pollution prevention approaches for reducing environmental impacts and costs.
Weyerhaeuser	Multi-media	*Timberland Resource Strategies:* Non-point BMP and pollution prevention; incorporate forestry management best practices into facility-wide EMS.
New England Universities Laboratories	Hazardous Waste	*University Laboratory Pollution Prevention and Recycling:* Erase the distinction between unused chemicals and waste chemicals in laboratories; support institutional recycling by managing all laboratory chemicals under an integrated approach.
Intel	Solid and Hazardous Waste	*Process Modifications and Waste Minimization:* Continuous improvement DfE approach to encourage pollution prevention and waste minimization; incorporation of voluntary measures into management plan.
Vandenberg AFB	Air	*Alternative Technological Solutions for Preventing Air Emissions:* Resource reallocation; test ways to reduce permit burdens at Federal facilities to encourage the use of pollution prevention and innovative technologies.
USPS Denver	Air	*Flexible Fuel Vehicle Replacement*: USPS will eliminate 794 delivery vehicles from the Denver area and replace them with lower-emitting flexible fuel vehicles. USPS Denver will earn mobile source emission credits.
Progressive	Air	*Testing Incentives for Pollution Prevention in Mobile Sources:* Unique voluntary insurance program that will base automobile insurance rates on specific driving factors such as mileage driven, time of day, and geographic location. This should be an incentive to reduce car travel, and therefore reduce mobile source air emissions.
Intel	Water	*Partnership for Water Reclamation and Reuse:* Unique partnership with a local municipality to reuse treated city wastewater and reclaim manufacturing process wastewater and reinject into local aquifer.
NS Mayport	Water	*Dredged Material Pollution Prevention Opportunities:* The Naval Station Mayport is seeking to examine and demonstrate innovative and beneficial reuse of dredged material.

Pollution prevention and recycling provide multiple pathways to sustainable development and environmental stewardship. EPA has defined pollution prevention as "source reduction" (which is explained under the 1990 Pollution Prevention Act) and protection of natural resources through conservation or increased efficiency in the use of energy, water, and other materials. Recycling shares many of the advantages of pollution prevention; it can reduce the need for treatment or disposal and conserve energy and natural resources. Many facilities use a broad definition of pollution prevention that includes recycling.

An EMS applies standard business principles to the management of an organization's environmental issues. An EMS does not determine a company's legal obligations; rather, it is a sophisticated tool used by companies to manage compliance and other environmental concerns. An EMS can help a company boost efficiency, cut waste, and improve worker safety. It also can bring attention to environmental matters that are not directly addressed through regulation, such as energy use.

Table 14 identifies several projects that are testing EMS, pollution prevention, and recycling options that demonstrate these facilities' commitments to sustainable development.

Linking EMSs to Standard Operating Procedures

The Experiment(s): Weyerhaeuser is striving to minimize the environmental impact of its manufacturing processes on the surrounding environment by pursuing a long-term vision of its Minimum Impact Mill. Weyerhaeuser has voluntarily instituted an EMS at the Flint River facility that conforms to the International Standard Organization (ISO) 14001 standard. The EMS will include operational procedures, record keeping, auditing, quality assurance, and permit requirements. Weyerhaeuser is also developing a comprehensive manual of standard operating procedures for plant employees. The Berry project had also committed to using an EMS based on ISO 14000. The project was designed to test the EMS approach as a means of promoting continuous improvement in environmental performance, pollution prevention, and source reduction strategies.

Results/Anticipated Outcomes: For Weyerhaeuser, the overall process of developing ISO 14001 documentation originally was scheduled for completion in mid-1997. Due to a company focus on other aspects of the Minimum Impact Mill vision, documentation has proceeded slower than expected and is now scheduled for completion late in 2000. For Berry, the work on the EMS itself had not begun before the project ceased implementation; the company had intended for the standard operating procedures and work instructions developed for the potential comprehensive operating permit to be compatible with ISO 14000. Both Weyerhaeuser and Berry believe that the strategies they have used to develop the EMSs have resulted in a more environmentally aware workforce. For example, in 1997 Berry reported that developing the standard operating procedures and work instructions helped the company reduce the cost of training and improved day-to-day compliance by focusing on how employees should perform their specific job responsibilities. Weyerhaeuser reported in 1998 that engaging their employees in the implementation of the revised EMS had begun to increase staff education and awareness of the environmental aspects of their jobs.

Transferability: When the implementation of the Weyerhaeuser project is further along, EPA plans to evaluate the benefits and challenges of the EMS approach. EPA will look to work with Weyerhaeuser personnel to collect data assessing the improvement in day-to-day compliance with environmental regulations attributable to the EMS. This will assist EPA in meeting a charge by the 1999 Innovations Task Force to report, by 2002, on the use and effectiveness of EMSs in improving environmental performance and achieving results. Also, on March 12, 1998, EPA issued a policy statement in the Federal Register,[10] describing a number of pilot projects, including Project XL, which will provide data on the actual compliance and environmental benefits of EMS approaches. The Federal Register Notice describes how a group of Federal and state officials involved in EMS pilot projects have been working together to set up a common national database of information gathered through the pilot projects. As part of that process, EPA and states

[10] Federal Register: March 12, 1998 (Volume 63, Number 48, Page 12094-12097).

developed a series of data protocols that provide instructions and survey instruments to guide the actual collection of data for the database. Future analysis of the Weyerhaeuser project also will be designed to support the EMS database.

Multi-facility EMSs

The Experiment(s): The Lucent project tests whether a corporate EMS can be the basis for streamlining the implementation of state and Federal regulations, consolidating permits, and improving Lucent's facilities' day-to-day compliance. The goal is to have more cost-effective systems that raise facility managers' awareness of their environmental obligations before they make decisions about modifying equipment and operations (rather than at the end of a long, expensive regulatory or permitting process) *and* allow regulators to focus more on compliance assurance and technical assistance. Table 15 below describes the project approach and goals.

Results/Anticipated Outcomes: Specific results for the Lucent project are not yet available. The FPA for the Lucent project is an "umbrella" agreement and is based on an existing, third-party-certified ISO 14001 EMS for the entire, global microelectronics business unit of Lucent Technologies. The FPA contemplates the development of specific proposals for regulatory flexibility and superior environmental performance at individual facilities. The umbrella FPA outlines a process that allows Lucent to use its EMS as a framework for developing facility-specific proposals to simplify permitting, recordkeeping, and reporting requirements, while driving continual improvement and pollution prevention programs.

Transferability: The EMS Federal Register Notice states that it is critical to measure any change in a facility's environmental performance that might be attributable to implementation of an EMS. Project XL can collect information on types, amounts, and properties of regulated and nonregulated pollutants that are reduced as a result of an EMS. In particular, the Lucent project will be able to provide this information on a multi-facility basis. EPA's EMS Federal Register Notice also states that Federal and state regulators are interested in understanding the involvement of local communities and other stakeholders in the EMS process. The Lucent project can collect data to assess the amount and degree of stakeholder and regulator participation in both the development and implementation of an organization's EMS, and the effect that participa-

Table 15: Lucent Project Approach and Goals

Approach	Goals
Develop a third-party-certified, high-quality EMS framework that can be used to: • identify significant, site-specific regulated and non-regulated activities, substances, or processes such as water usage, wastewater discharge, air emissions, energy usage, chemical consumption, raw material consumption, and land use that interact with the environment; • set and achieve site-specific performance goals for reducing environmental impacts; and • ultimately, integrate critical information and performance goals into a single, companywide matrix that facilitates understanding and accessibility for stakeholders, assists in measuring performance and accountability, and potentially serves as the core of a companywide consolidated permit.	To develop site-specific flexibilities that would lead to superior environmental performance and improved environmental management at each Lucent facility. The ultimate goal is to use the EMS as a platform from which the company can, over time, consolidate all Federal and state permits for its domestic facilities into a single companywide multi-media permit. This permit would be based on objectives and targets set annually and jointly by the company and regulators. Involving regulators in this EMS approach would result in a *de facto* annual review of the permit, eliminating multiyear renewals of individual permits.

tion has on the public credibility of the facility's EMS implementation. EPA plans to evaluate the benefits and challenges of these EMS approaches designed to support the Innovations Task Force report and the goals of the EMS database.

Waste Minimization and Pollution Prevention Assessment

The Experiment(s): The Crompton (formerly Witco) project conducted a comprehensive waste minimization/pollution prevention (WM/PP) study for its Sistersville, West Virginia, facility. The following focuses on this WM/PP study and Crompton's commitment to methanol recycling.

Instead of occurring as a single event outside the purview of routine business operations, the Crompton WM/PP study was an employee-driven effort that sought to identify and integrate pollution prevention approaches into the company's standard operating practices using a third-party contractor to conduct the study. The WM/PP opportunity assessment facilitated employee involvement in the process and implemented an approach tailored to the specific needs of the facility. Crompton used a multiphased process to conduct the study: (1) identifying and characterizing plantwide wastes and emissions, (2) screening and prioritizing these wastes and emissions, (3) identifying pollution prevention options, (4) screening and prioritizing pollution prevention options, (5) examining the technical and economic feasibility of these options, and (6) developing an implementation plan.

A WM/PP study team (made up of Crompton management and employees and an independent contractor, STV Incorporated) was established to guide and conduct the daily activities of the WM/PP Study. Employee brainstorming sessions were a key component of this process. These sessions included representatives from a cross-section of the plant's technical and operating staffs. In addition, an advisory committee was established to offer comments and suggestions throughout the study process. Through the use of this advisory committee, Crompton involved EPA, West Virginia DEP, the International Chemical Workers Union Council, and other stakeholders in the study phase of the WM/PP Project.

Another aspect of the Crompton project is the commitment to recycle methanol. Previously, excess methanol produced in Crompton's Sistersville facility was condensed, collected, and either disposed of in the facility's wastewater treatment unit or incinerated. Under the project, Crompton is reusing, recycling, or thermally treating 95 percent of the collected methanol. This will minimize the biotreatment of methanol in the facility's wastewater treatment units and reduce sludge generation. Table 16 describes the project approach and potential savings from the Crompton project.

Table 16: Crompton WM/PP Project Benefits

Crompton Waste Minimization/Pollution Prevention Study		Potential Cost Savings	Potential Waste Emission Reductions
Expected recurring/ ongoing savings	One-time pollution prevention options—completed in 1998	$ 42,000	26,000 pounds
	Project air emissions reduction and methanol recycle (excludes capital savings).	$ 16,000 per year	1,100,000 pounds per year
	Other pollution prevention options in progress or put in place July 1998–June 1999.	$620,000 per year	730,000 pounds per year
	Total savings	$640,000 per year	1,830,000 pounds per year

**Crompton has not yet assigned the expense of implementing these projects, and when it does the net cost savings will be less.*

Results/Anticipated Outcomes: A final report was published in December 1998 as a result of the WM/PP study. This report laid out 330 pollution prevention options that were determined to be technologically and economically feasible. Crompton's Annual Project XL Report (July 31, 2000) lists a total of 370 pollution prevention opportunities that have been identified. Of these, 26 are at some stage of study and 67 have been implemented. Table 16 is a summary of some of the potential cost savings and potential waste or emissions reductions to be gained by the pollution prevention options identified by the Crompton WM/PP study.

The most promising identified opportunities are reviewed and selected by an internal Pollution Prevention Council, which was established in 1998 as a result of the WM/PP study. The Pollution Prevention Council, representing many plant functions, meets monthly. Council members choose the most promising opportunities identified in the final report to pursue, including options originally deemed not feasible, as well as offering other ideas. The Pollution Prevention Council maintains an "evergreen" list of ideas—a list of prioritized waste problems along with a list of pollution prevention projects that have been proposed to resolve those problems—which are reviewed at each monthly meeting.

As a result of the Crompton methanol recycling effort, the amount of sludge generated by the wastewater treatment system and disposed of in an on-site hazardous waste landfill will be decreased by about 815,000 pounds per year.

Transferability: The Crompton project approach toward pollution prevention and recycling may offer an innovative model for other chemical intermediate-product manufacturers. Some pollution prevention approaches can be implemented through modifications to existing standard operating procedures combined with careful training on the new procedures and follow up to ensure those procedures are carried out. Involving facility-level personnel "up-front," even in the development of the process itself, has proven valuable and could have application at other facilities. Including a broad spectrum of employees representing many plant functions has helped to instill a facility-level culture in which individual employees are trained and empowered to continuously identify and implement new pollution prevention opportunities and strategies. This approach has required a clear management commitment on the part of Crompton to commit resources and institute technically and economically feasible pollution prevention measures.

Timberland Resource Strategies

The Experiment(s): Weyerhaeuser manages over 300,000 acres of timberland in Georgia, with impacts on more than half of the river basins in the state. As a component of the Weyerhaeuser project's Minimum Impact Mill vision and as a means to further protect the Flint River, neighboring wildlife habitats, and unique parcels on its forest land, Weyerhaeuser has undertaken management changes to enhance its Forestry Management System. These methods are expected to improve water quality and wildlife habitat, soil stability and increase soil productivity while sustainably producing wood and forest products. Weyerhaeuser has incorporated its forestry management strategies into the Flint River facility-wide EMS. Weyerhaeuser is also engaging in cooperative efforts to ascertain how company forest lands can contribute to the conservation of threatened and endangered species.

Results/Anticipated Outcomes: The modified Forestry Management System has produced a more holistic view of the forest management approaches applied to the forest lands serving the Flint River facility. It has shifted forest management from a remediation, reactionary approach to a more proactive, continuous improvement one (see Table 17). Time formerly spent on remediation of roads and streams and other impact abatement activities is now spent on process improvements and preventive measures.

Transferability: Weyerhaeuser's Forestry Management System offers a framework for other facilities that are seeking to integrate their forestry management strategies into a facility-wide EMS. It also offers an effective model for the incorporation of responsible practices and a continuous improvement approach into forest management for those facilities that rely on a consistent, high-quality source of wood and wood-related products. In

addition, the project provides the opportunity to explore how performance and management objectives and principles can serve as leverage points with vendors and contractors.

Variability in environmental performance in the forest products industry could serve as a potential barrier to broader scale transfer and application of an enhanced forestry management system. Weyerhaeuser manages its operations to reduce the ecological footprint of the Flint River facility. Compared to similar pulp and paper operations, the Flint River facility produces only 10 percent of the air emissions and uses only 20 percent of the forest land needed for an equivalent unit of production. Diversity of forest types and growth rates across the country and differing forest land management desires and systems could also impact the applicability of a timberland resources strategy.

Table 17: Weyerhaeuser Timberland Strategies

Forestry Management System	
Environmental Performance	Improvements have been seen in: Water quality—through reduced sediment loading and enhancement and establishment of riparian zones (aquatic habitat benefits as well). Soil stability—through better management and planning of roads, site preparation prior to harvesting. There are approximately 500 miles of roads managed by this facility; historically approximately 20 miles of road a year needed repair. With careful planning of new roads and retirement of older roads, less remediation has been needed, thus soil erosion into streams has been reduced. Identification and management of forestland wildlife habitats.
Internal Process	Weyerhaeuser has worked to integrate the forestry management system into the facility-wide EMS. The Flint River facility's total quality management system is ISO 9000 certified and the facility has implemented an EMS that complies with the ISO 14001 standard, although the facility is not ISO 14001certified at this point. Weyerhaeuser supports and applies principles of the Sustainable Forestry Initiative (SFI) and expects that its contractors meet SFI principles and objectives as well to ensure timber coming to the plant has been grown and harvested using responsible forestry practices. The forestry EMS has been significant from a forest stewardship and sustainability perspective and has created economic benefits as well.
Community Outreach	To broaden the application of responsible practices and sustainable forestry, Weyerhaeuser has taken a lead role in updating the forestry best management practices (BMPs) for the State of Georgia. Under the direction of the Georgia Forestry Commission, work was conducted with nonprofit organizations, government agencies and private landowners to develop comprehensive guidelines designed to improve wildlife habitat and water quality in the state's private forests. Weyerhaeuser has undertaken other cooperative, outreach, and public education activities to empower landowners and other forest managers with the tools to advance responsible forestry practices.
Resource Management Practices	Weyerhaeuser's forestry practices lead to forests that produce two to three times as much wood per acre as unmanaged forests. In addition to increased productivity, harvested sites are prepared for prompt reforestation. In 1998, over 78 percent of its harvested lands were replanted within one year. Forest strategies also seek to minimize waste during harvesting and to encourage the use of other products from the forest.

University Laboratory Pollution Prevention and Recycling

The Experiment(s): The New England Universities Laboratories project includes several provisions designed to result in increased pollution prevention. One of the objectives of the laboratory environmental management plan (EMP) and the overall project is to erase the distinction between unused chemicals and waste chemicals in the laboratory setting so that the value in reusing chemicals can be realized. Thus, all laboratory waste in this project will be managed under a single standard in the laboratory. The determination whether a laboratory waste can be reused within the university will be made at a central accumulation facility within the university by environmental health and safety professionals.

According to a 1996 survey of about 100 academic institutions by the Campus, Safety, Health, and Environmental Management Association, less than 1 percent of the hazardous chemical waste otherwise destined for disposal was reportedly redistributed or reused on-site. Under this project, the participating universities will be able to more easily facilitate the reuse of chemicals on a university-wide basis. For example, chemicals that are no longer of sufficient purity for use in a research laboratory could be used by teaching laboratories, or if a researcher in one department no longer needs certain raw material chemicals, rather than disposing of them as waste, these chemicals could be available to other departments in the university for use. Waste reduction will be encouraged as a result of the more comprehensive waste exchange systems throughout the institution.

Results/Anticipated Outcomes: The New England Universities Laboratories project is expected to result in increased pollution prevention. The participating universities have set specific pollution prevention goals including a 10 percent reduction in the overall amount of hazardous waste generated from participating laboratories (from the baseline), and a 20 percent increase (from the baseline) in reuse of laboratory waste over the life of the project. The universities will report each year on their progress in meeting these goals.

One element of the Laboratory EMP is a requirement to define a list of "hazardous chemicals of concern" and annually conduct a risk assessment survey of these chemicals in the laboratory. This list will be developed on an institution-by-institution basis because the types of hazardous chemicals at a particular institution will vary with the type of work done there. This list will be reviewed on an annual basis and adjusted to ensure that it covers an adequate breadth of hazardous materials. This documented assessment will enhance both waste and risk minimization efforts and move laboratory personnel/inspectors away from discussions as to whether a hazardous material on the shelf is a RCRA hazardous waste.

The proposed surveys will support institutional chemical reuse and/or the timely disposal of hazardous chemicals that are approaching or have exceeded their shelf life. The surveys will also document that hazardous chemicals of concern that remain on the shelf have been assessed for product integrity and risk to human health and the environment.

Transferability: Laboratory waste management currently accounts for the most substantial expense for environmental, health, and safety (EHS) programs at the participating universities. This project is intended to allow these institutions to more effectively promote and implement pollution prevention programs in their laboratories. It is intended to reduce waste disposal costs and reduce chemical purchasing costs without diminishing the level of environmental protection associated with the proper handling and/or disposal of hazardous laboratory wastes.

The three participating universities are members of the Campus Consortium for Environmental Excellence (C2E2) originating in the New England geographic region. As members of that Consortium, each participant strives to promote pollution prevention and environmental performance monitoring for laboratories. In addition, the participants are seeking to continuously improve their laboratory EHS programs. The lessons learned from these pilots may be transferable to other C2E2 members, as well as other academic institutions, hospitals, and corporations with extensive laboratory efforts.

Sharing information about managing and minimizing laboratory wastes and other environmental impacts will result in economic and social values for the participants and distinguish them as leaders in the EHS field.

Process Modifications and Waste Minimization

The Experiment(s): The Intel project seeks to minimize the use and generation of hazardous waste while exploring the value of incorporating non-regulated (voluntary) items into its EMP. While Intel is not legally required to recycle the solid, hazardous and non-hazardous wastes generated at its Fab-12 facility, it has committed itself to specific recycling goals. Notwithstanding its voluntary recycling targets, Intel's goal is to reduce the total amount of hazardous waste generated and used at the facility and to shift as much hazardous waste as possible into the non-hazardous waste category. To affect this switch, Intel is applying a design for the environment (DfE) approach to its manufacturing process development. Intel develops new chip-making processes every two years and incorporates environmental improvement into manufacturing processes through process and technology design and chemical screening. These process design and technology improvements enable Intel to continuously refine the management of its waste resources. Intel's waste management goals will also reduce the impact of the Ocotillo facility on waste treatment or disposal facilities. Intel has committed to report its waste recycling activities in its consolidated report to equip stakeholders with information to evaluate Intel's progress toward attainment of these recycling goals.

Results/Anticipated Outcomes: Through its development and implementation of more environmentally compatible manufacturing processes, Intel has integrated environmental considerations into its decision-making process to lessen the environmental burden of waste generation at its Ocotillo facility. Intel is seeking to spur source reduction of hazardous waste use with an front-end manufacturing process design approach based on the DfE model of continuous process improvement. This model incorporates environmental improvement into process development before these manufacturing processes are implemented at Intel facilities. The DfE approach will (1) reduce the total amount of hazardous wastes used and generated during manufacturing processes and (2) employ chemical screening to shift manufacturing processes towards increased use of non-hazardous materials. These materials shifts complement one another, and Intel expects that they will lead to a decrease in the percentage of hazardous waste available for recycling while increasing the percentage of non-hazardous waste available for recycling. Intel is increasing the amount of solid waste recycled by looking outside the scope of typical solid waste streams at its facility. Intel's progress towards attaining its recycling goals is outlined in Table 18 on the following page.

Transferability: Intel's focus on using process design and development to drive source reduction and improve environmental management could have applications for other technologically dynamic firms facing comparable rapid evolution of manufacturing process technologies. The continuous improvement DfE approach offers a model of how up-front consideration of environmental goals can be incorporated into traditional business decisions and product/process development cycles to achieve superior environmental performance. The Intel project offers the opportunity to analyze (1) the value of incorporating voluntary targets into an environmental management strategy, (2) barriers to effectively interfacing environmental goals and process development to create environmentally compatible products and processes, and (3) how chemical selection protocols might affect process design and reduce the amounts and toxicity of hazardous materials used in manufacturing processes.

Table 18: Intel Project Goals and Progress

Waste Minimization		
	Intel Goals	**Intel Progress**
Hazardous Waste	1997— recycle 60% of hazardous waste generated	1997—67% of hazardous waste recycled
	1999—recycle 50% of hazardous waste generated	1998—53% of hazardous waste recycled
	2001—recycle 40% of hazardous waste generated	1999—65% of hazardous waste recycled
Non-hazardous Chemical Waste	1997—recycle 25% of non-hazardous waste generated	1997—58% of non-hazardous waste recycled
	1999—recycle 50% of non-hazardous waste generated	1998—49% of non-hazardous waste recycled
	2001—recycle 70% of non-hazardous waste generated	1999—78% of non-hazardous waste recycled
Solid Waste	1997—recycle 40% of solid waste generated	1997—42% of solid waste recycled
	1999—recycle 55% of solid waste generated	1998—67% of solid waste recycled
	2001—recycle 60% of solid waste generated	1999—67% of solid waste recycled

Alternative Technological Solutions for Preventing Air Emissions

The Experiment(s): The Vandenberg AFB project is testing new budgetary approaches that will allow the DoD to spend resources on pollution prevention programs, innovative technologies, and other approaches that will cost-effectively reduce environmental impacts. The Memorandum of Agreement established a framework for developing ENVVEST[11] pilot programs at three to five DoD facilities. The Vandenberg AFB in Santa Barbara County, California, was selected as the first DoD facility to pilot the ENVVEST program and implement cost-effective environmental protection.

Through this XL/ENVVEST project, Vandenberg AFB committed to upgrade ozone-precursor emission controls using resources that would otherwise be spent complying with Title V of the CAA requirements, such as permitting, record keeping, monitoring, and training. When Vandenberg AFB reduces ozone-precursor emissions to agreed-upon levels, its designation under Title V as a major source of ozone-precursor emissions (primarily NO_x) will be reduced to a designation as a minor source, resulting in a substantial reduction in air emissions and compliance costs for Vandenberg AFB. Near term, obtaining reductions has focused on boilers, furnaces, and process heaters.

Result(s): Vandenberg AFB has committed to reducing annual emissions of ozone precursors by two tons per year by April 30, 2000, and by ten or more tons per year by November 30, 2002. NO_x reductions will be accomplished by retrofitting or replacing those boilers with the highest potential for emission reductions, and VOC reductions will be accomplished by assessing the emission reduction potential from solvents, surface coatings, and other VOC emission sources. To date, actual NO_x emission data has been collected from nearly 30 preselected candidate boilers to determine baseline emission levels and the potential emission reduction resulting from a boiler retrofit/replacement

[11] As part of the Administration's reinvention initiative, EPA and DoD signed a Memorandum of Agreement in 1995 that established how the two agencies would interact during implementation of DoD's Environmental Investment (ENVVEST) program. The ENVVEST program emphasizes regulatory compliance through pollution prevention and provides an alternative to prescriptive regulatory requirements through a performance-based environmental management system designed to attain superior environmental results.

project. Similarly, targeted VOC reductions will entail the application of low, and zero-VOC coating substitutions for both architectural and corrosion-control operations.

While the emissions reductions achieved by controlling emissions from the candidate boilers fell short of the 10-ton goal, Vandenberg AFB has evaluated alternative activities to help achieve the goal. Activities include:

- using internal combustion engine control technologies to reduce NO_x emissions from aerospace ground equipment;
- replacing lawn mowers and other ground maintenance and irrigation equipment that use internal combustion engines with electric equipment;
- using zero-VOC paints and coatings in corrosion control, industrial facility painting, and architectural interior and exterior coating operations;
- consolidating paint booth operations to include application of corrosion control coatings to reduce VOC emissions; and
- implementing an electric vehicle (EV) fleet program.

On August 25, 1999, Vandenberg AFB presented a proposal to the Santa Barbara County Air Pollution Control District for investing the balance of ENVVEST funds in an EV fleet pilot program. This program will help achieve the remaining reduction requirements.

Transferability: The Vandenberg AFB project is testing ways to reduce regulatory burdens at Federal facilities. Likewise, the Vandenberg AFB could be a model and benchmark for other DoD facilities. This innovative approach in applying resources toward high-priority environmental problems that, in turn, will result in lower costs and reduced environmental emissions from the facility, should offer useful data for other DoD applications.

Flexible Fuel Vehicle Replacement

The Experiment(s): The United States Postal Service (USPS) Denver project will reduce its impact on air emissions in the Denver, Colorado, area by replacing high-emission vehicles with low-emission ones. USPS has committed to (1) using at least 794 new, alternative fuel vehicles in Denver and (2) helping support the development of an infrastructure to support these vehicles. As part of the Colorado Environmental Leadership Program and Project XL, USPS will remove 794 delivery vehicles used in Denver and replace them with transitional low-emitting vehicles (TLEVs). In exchange for these commitments, the USPS will receive credits from the State of Colorado that can be used to satisfy the vehicle purchase requirements of the Colorado Clean Fuel Fleet Program (CFFP).

This delivery vehicle replacement project will reduce the USPS's contribution to mobile source emissions in the Denver area. While it is in the process of redesignating for CAA attainment, the Denver metropolitan area is currently in nonattainment for CO. The CAA requires states with ozone and CO nonattainment areas to revise their State Implementation Plans (SIPs) to incorporate a CFFP. Section 246 of the CAA provides that a SIP submission must require fleet operators with ten or more vehicles that are or are capable of being centrally fueled, to include a specified percentage of clean-fuel vehicles in their new vehicle purchases each year. In the Denver area, compliance with the Colorado CFFP requires 50 percent of the new vehicle purchases to be low-emitting vehicles (LEVs).

USPS sought partial relief from Colorado's CFFP requirements. The State of Colorado is using the USPS's vehicle replacement actions as a substitute for the federally required Clean-Fuel Vehicle Program for the Denver nonattainment area. In order to qualify as a substitute program, all requirements that USPS has agreed to will be made enforceable through a SIP revision.

Results/Anticipated Outcomes: Delivery of the first group of vehicles is expected in October 2000. Due to the unique specifications needed for USPS delivery vehicles, the only bid received for this pur-

chase involved TLEVs, which would not meet LEV requirements. TLEVs are capable of using unleaded gasoline with up to 85 percent ethanol (E-85) and meet or exceed California TLEV certification standards. Flexibility under the Colorado CFFP will allow aging postal delivery vehicles to be replaced with TLEVs. For each E-85 vehicle that the USPS deploys in Denver, it has agreed to remove either a pre-1984 route vehicle or a long-life-vehicle (LLV—1987-1991 vintage) from service in the Denver area. The USPS project commits to destroying 512 pre-1984 delivery vehicles and relocating 282 LLVs to other western cities where they will replace aging fleet vehicles. The destruction and relocation of vehicles is planned for completion by July 31, 2001. As each of the vehicles to be scrapped emits approximately 250 pounds more CO_2 per year than an E-85 vehicle, this replacement program is anticipated to significantly decrease USPS's contribution to mobile source emissions in the Denver metropolitan area.

USPS has developed technical specifications for modifying an existing underground storage tank to properly house E-85 fuel. This modified underground storage tank will serve as a demonstration project for public evaluation of alternative fuel storage.

Transferability: The USPS project will replace older, higher-emission vehicles with new, lower-emissions flexible fuel vehicles (FFVs) and could serve as a model for vehicle fleets across the country. In addition, as the project proceeds, there will be an opportunity to examine and evaluate the opportunities and barriers in developing and maintaining an E-85 fueling infrastructure. The intent of the USPS Western Area Flex Fuel Vehicle Plan is to concentrate new FFVs in a small number of metropolitan areas across the western United States, concentrating FFVs at facilities within those areas. An objective in this strategy by the USPS is to promote the development of a retail E-85 fueling infrastructure. Lessons learned from USPS development of an E-85 substructure could have application in the development of any alternative fuel infrastructure.

Testing Incentives for Pollution Prevention in Mobile Sources

Experiment: The Progressive Auto Insurance (Progressive) project supports a unique voluntary insurance program that will base automobile insurance rates on specific driving factors such as mileage driven, time of day, and geographic location, in addition to more customary factors such as age, sex, and marital status. This new program is made possible through the use of a global positioning system (GPS) device installed in customers' vehicles. There are plans underway for a number of automobile manufacturers to incorporate progressive's technology in their GPS units for new vehicles. The information recorded by the device ensures that the cost of insurance is based on the usage of the vehicle. The focus of this project is an analytical study that will determine the extent to which the Progressive program has an effect on environmental quality. EPA is interested in determining the degree to which people who sign up for Progressive's usage-based insurance program reduce their total driving or their driving during congested periods, which could result in lower mobile source emissions. According to EPA's Indicators of the Environmental Impacts of Transportation report released in October of 1999, U.S. travel is responsible for a substantial portion of U.S. ozone precursor emissions (31 percent of VOCs and 36 percent of NO_x), 61 percent of nationwide CO emissions, and 31 percent of CO_2 emissions. Although Progressive is not currently requesting regulatory relief, if future analysis shows that the project is environmentally beneficial, some alternatives might be explored that will offer regulatory flexibility.

Anticipated Results: Progressive's system, which has already been piloted in Texas, is designed not only to lower costs for its customers, but also to encourage positive driving behaviors that may lead to a reduction in accidents and harmful air emissions. By measuring and integrating factors that relate to vehicular use into insurance rates, Progressive is providing its customers with a financial incentive to drive less and choose alternate forms of transportation, which could reduce negative environmental impacts from automobile usage. Thus far, Progressive has not directly measured the en-

vironmental impacts of this program. However, if consumers respond to the increased per mile costs of a usage-based insurance program in the same way as they do to the variable costs associated with rising fuel prices, a significant reduction in vehicle usage could result.

The possibility of offering SIP credits in those states that enable this program to move forward is one alternative for offering regulatory flexibility in the future. In 1997, EPA adopted a policy to allow credit in SIPs for Voluntary Mobile Emissions Programs designed to reduce emissions. The policy allows 3 percent of the total reductions needed for attainment in a local or regional geographic area to be from voluntary mobile source reduction programs.

Transferability Potential: As the Progressive project proceeds, it will analyze the extent to which usage-based auto insurance can positively impact vehicle miles traveled and associated air quality impacts. This unique approach has already been made available in the state of Texas and could benefit other states concerned with transportation and air quality problems. Progressive has taken steps to begin pilot programs in the states of Ohio, Illinois, and California. A potential difficulty involved in expanding the program is the limited availability and high expense of GPS technology. Facilitating the retrofitting of GPS systems in older vehicles to enable participation in Progressive's program is necessary to ensure that the benefits extend to consumers in all income brackets and that drivers of older, more pollution prone vehicles can be rewarded for driving less. Expansion of the program will also be dependent in part on the insurance regulations in specific states.

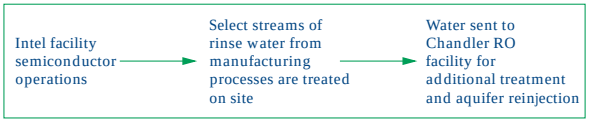
Partnership for Water Reclamation and Reuse

The Experiment(s): The Intel project, an innovative partnership between the company and the City of Chandler, has created opportunities to (1) reuse treated city wastewater at the Intel facility for use in cooling towers and on landscaping (Figure 2) and (2) reclaim rinsewater used during manufacturing processes for reverse osmosis (RO) treatment and reinjection into the local aquifer (Figure 3). Intel needs high-quality water for semiconductor operations, thus the two water use streams are not connected and are used in different processes.

Figure 2

Use of Treated City Wastewater: Intel has committed to voluntarily minimize its consumption of freshwater by using treated city effluent for consumptive uses of semiconductor manufacturing cooling tower makeup and landscaping. Intel will purchase water from the Ocotillo Management Group that has been treated by the City of Chandler. Intel's initial goal was to achieve 100 percent use of treated water by January 1997.

Figure 3



Reclamation of City Water: Intel's core manufacturing processes need high-quality water, but Intel has arranged for the treatment of some of the rinsewater from its manufacturing processes for reuse or reinjection into the groundwater to help replenish the local aquifer. The rinse water is first treated within the facility and is then treated at an off site facility using RO filtration. The City of Chandler can either recharge the treated water into the groundwater to replenish the aquifer or reuse the water. The city recharges the local aquifer under an Aquifer Protection Permit issued by the State of Arizona.

Results/Anticipated Outcomes: Although there is no regulatory requirement or standard to serve as a baseline, Intel will significantly reduce its freshwater demands through its water reclamation and reuse goals.

Reuse of Treated City Wastewater: The percentage of wastewater reuse is calculated by the quantity of city effluent used for landscaping and cooling tower makeup, divided by the total quantity of water used for landscaping and cooling tower makeup. A mid-course review in January of 1999

changed the established goal of 100 percent to 95 percent* use of treated city effluent for cooling tower and landscaping use. This change was enacted based on a review of cooling tower design and the need to ensure that there is a constant supply of water for cooling tower uses during maintenance downtime at the city treatment plant. Intel's effluent reuse results are shown in Table 19.

Reclamation of City Water: The RO filtration process treats the process rinse water to applicable drinking water standards before it is returned to the local aquifer. Intel's reclamation results are shown in Table 20.

As a result of the Intel project commitment to use treated wastewater from the City of Chandler's POTW, the city received a grant to study reuse options for industrial process water. The study examined the selective use of manufacturing process effluent in cooling tower applications and the use of cooling tower effluent for specific irrigation needs. The study has led to the development of a model that portrays the representative quality of cooling tower effluent to help determine if it can be reused in other applications.

Transferability: The water conservation partnership between Intel and the City of Chandler provides an innovative model for arid regions that are increasingly faced with low groundwater replenishment rates and for areas of where municipal water suppliers need to conserve water in both domestic and non-domestic activities. In Arizona, the 1980 Groundwater Management Act provided such a requirement for the City of Chandler. As water cost and scarcity increases, treated effluent is one "source of water" that is expected to continue to increase and could provide future water supplies through reclamation and reuse.

Table 19: Intel Reuse Results

Reuse of Treated City Water		
Year	Treated Effluent Reuse Performance Goal	Treated Effluent Reuse Achieved
1997	100 percent use of treated city water for landscaping and cooling tower uses	Ocotillo facility achieved 80 percent use of treated effluent. (132 million gallons of water)
1998	100 percent use of treated city water for landscaping and cooling tower uses	Ocotillo facility achieved 97 percent use of treated effluent (183 million gallons of water)
1999	* Revised goal to achieve 95 percent use of treated city water for landscaping and cooling tower uses	Ocotillo facility achieved 98 percent use of treated effluent (205 million gallons of water)

Table 20: Intel Reclamation Results

Process Water Reclamation		
Year	Reuse Performance Goal	Reuse Achieved
1997	45 percent of the total volume of freshwater purchased from the city will be sent to the city's effluent treatment plant for recycling	66 percent of water purchased from the city was returned for RO treatment and re-injection into the aquifer (355 million gallons)
1998	No goal established for 1998	61 percent of the water purchased from the city was returned to the city for treatment (399 million gallons)
1999	55 percent of the total volume of freshwater purchased from the city will be sent to the city's effluent treatment plant for recycling	61 percent of the water purchased from the city has been returned to the city for treatment (422 million gallons)

The Intel project also explores the importance of tailoring environmental performance to an issue relevant to a local community (water conservation) and serves as the foundation for a model to identify potential cooperative water conservation projects between industries and their neighbors. In addition to identifying technical and economic opportunities to conserve and reuse treated water, there will be a need to examine any technical and economic barriers to reclamation and reuse. Issues to further explore include (1) the costs of RO technology and the opportunities as well as costs to design systems from the ground up to allow them to use treated effluent; (2) the potential cost barriers of retrofitting facilities to enable them to reuse treated effluent; and (3) the potential technical limitations and high cost of treating and reusing process effluent. (Cooling towers can experience problems with microbial growth and solid precipitates from treated POTW effluent.)

Dredged Material Pollution Prevention Opportunities

The Experiment(s): In an effort to eventually eliminate ocean dumping of its dredged material, Naval Station Mayport (NS Mayport) in Jacksonville, Florida, is seeking to use the Project XL/ENVVEST process to examine and demonstrate innovative and beneficial reuse of the dredged material. The proposed reuse options will be (1) production of construction building blocks and (2) production of artificial reef material for new or repaired reef habitat. To maintain sufficient depths for naval ships, NS Mayport must dredge approximately 600,000 cubic yards of sediment from the entrance channel on the St. John's river and the installation's turning basin every 18 to 24 months. Historically, this material was stored in two upland holding sites at the installation. Once this space was exhausted in 1993, ocean disposal of the dredged material was approved temporarily by U. S. Army Corps of Engineers (USACE) for the naval station.

EPA and USACE share responsibility for managing ocean disposal of dredged materials. Permits for disposing dredged material into ocean waters are issued by USACE, subject to EPA concurrence. NS Mayport is currently required to obtain three permits with three different durations to dredge and dispose of its maintenance sediment—two permits from USACE and one from the State of Florida. The naval station has sought flexibility to adjust the lengths of these permits to synchronize their duration and combine their testing and evaluation requirements. Through Project XL, NS Mayport, EPA, USACE, Florida Department of Environmental Protection, and the City of Jacksonville are creating a partnership to provide flexibility by streamlining the dredging and ocean disposal process by means of extending the length of one permit to synchronize permit cycles. Anticipated savings from the streamlining process and the reduction in paperwork from synchronized or extended permits will be reinvested into development of the beneficial reuse applications for the dredged material.

Results/Anticipated Outcomes: The NS Mayport project is pursuing pollution prevention opportunities through the minimization and eventual elimination of ocean disposal of dredged maintenance material. Current dredging cycles at NS Mayport are generating more than 600,000 cubic yards of sand and silt every two years. Lacking the ability to develop products through the reuse of dredged material, NS Mayport has estimated that by 2020, it will have disposed of nearly 10 million cubic yards of dredged material in the ocean.

Initially, the dredged material for construction of the building blocks and artificial reef material will be derived from the existing upland storage cells. During this time, ocean disposal of freshly dredged material will continue. After these storage cells are emptied, dredged material will be stored temporarily in one of the upland storage cells, thereby eliminating the need for ocean disposal. The second storage cell will be used for constructing building blocks and artificial reef material. By establishing a procedure and cycle for using the two storage cells for reuse projects and temporary dredged material storage, NS Mayport anticipates it would be able to continue to use the cells in perpetuity without reaching capacity. In addition, NS Mayport has proposed using excess fly ash from the local electric authority as a solidification material for the construction blocks (not for reef material). If fly ash is not suitable, another solidification agent will be used in the construction blocks.

This project will proceed in phases that will allow NS Mayport to demonstrate and evaluate that the dredged material finished products are safe to human health and the marine environment. Implementation will include (1) collecting samples of dredged material from the upland disposal sites to ensure they meet all Federal, state, and local building requirements; (2) researching the cost and benefits analysis to support long-term commercial and/or public use of the new materials; and (3) evaluating the need and cost effectiveness of mobilizing portable equipment to manufacture products at or near the upland storage cells. If it is determined that the finished products present any risk to human health or the marine environment, implementation will stop.

Transferability: The disposal of dredged material is a Navy-wide as well as nationwide issue, and this project can serve as the test bed to investigate the degree of transferability and savings beyond NS Mayport. While complete elimination of ocean disposal may not be feasible at all similar locations, the NS Mayport ENVVEST/XL project could serve as a model for other locations seeking to decrease the frequency and amount of ocean disposal for dredged material.

Additionally, designated in 1994 as the Navy Environmental Leadership Program East Coast facility, NS Mayport has been charged with leading the development of innovative technologies and state-of-the-art management practices to reduce the ecological footprint and effect of naval facilities. In setting an environmental management standard for all Navy installations, NS Mayport will look to export its lessons learned from this project throughout the Navy and the Department of Defense.

Stakeholder Involvement[12]

The American public has demanded active involvement in community decisions that affect their health and the quality of their environment. In response, EPA is increasing public participation in its programs and providing more environmental information to help the public understand critical, and often complex, issues. EPA also hosts forums like the National Community Involvement Conference to support public participation in environmental issues. In addition, EPA is revising the regulations that guide public participation efforts and providing models to help staff learn how to get the public involved in their work. Project XL is an opportunity to test new stakeholder involvement approaches that give communities a clearer, more coordinated voice in crafting environmental solutions.

Stakeholder involvement is one of the eight Project XL selection criteria. Because the projects involve innovative strategies that differ from what would be allowed under regulation, this ensures that the public has ample opportunity to review and influence actions first. However, stakeholder involvement in these experiments has also been very challenging. Project XL, as a program, has sought out approaches (through principles, tools, and processes) that support collaborative working relationships with project sponsors, government representatives, and stakeholders. Table 21 identifies these approaches.

Table 21 : Stakeholder Involvement Innovations

Project(s)	Media	Innovation
ExxonMobil	Hazardous Waste Site Remediation and Reuse	*Enhanced Stakeholder Involvement:* Unique approach by working closely with stakeholders to plan the cleanup and determine the future uses for the contaminated site; to ensure that the site will be redeveloped for business or commercial use after cleanup.
Weyerhaeuser Intel Merck HADCO	Multimedia	*Stakeholder Involvement in Experimental Projects:* Identifying models for stakeholder involvement; evaluation of models linking public participation to environmental decision-making.
Program-wide	Multimedia	*Multistakeholder Involvement in "Reengineering":* Manual for EPA Project XL Teams, Project XL Stakeholder Involvement Guide and Project XL—Best Practices for Proposal Development: Using a corporate sector tool called "work process reengineering" to engage stakeholders in major redesign and restructuring of core program practices.
Program-wide	Multimedia	*Project XL Stakeholder Involvement Guide:* Developing a clear, plain language guide that provides helpful ideas and tools to project sponsors and stakeholders for successful interactions.
Program-wide	Multimedia	*Capacity and Trustbuilding:* Providing technical assistance and professional facilitation to improve trust among stakeholder groups and to build local stakeholder participation.

[12] To avoid duplication, this section does not cover innovations in other core functions that address stakeholder involvement issues such as "Internet Reporting and Stakeholder Input" (environmental information management and access).

Enhanced Stakeholder Involvement: Facilitating Site Redevelopment

The Challenge(s): To facilitate the likelihood that the Fairmont Coke Works Site will be redeveloped for business or commercial use after cleanup, ExxonMobil has committed to (1) involve stakeholders and community groups in planning the cleanup and determining future uses for the site, (2) demolish and dispose of all on-site structures, and (3) seek interested developers for property redevelopment. Public involvement in the traditional Superfund process can vary from site to site. ExxonMobil, EPA, and West Virginia DEP have agreed to go beyond the minimum Superfund community relations requirements in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and involve the community through its representative, the Fairmont Community Liaison Panel (FCLP), in the planning and implementation of the site cleanup. ExxonMobil, the state and the FCLP have resolved to work together to build a process geared toward achieving a consensus on major aspects of the cleanup and incorporating potential reuse opportunities into the cleanup process.

Although commercial redevelopment is typically not addressed in the Superfund process, the Fairmont community has expressed a strong interest in redeveloping the site. The site is suitable for redevelopment due to its location and size. ExxonMobil, beyond its statutory responsibility to clean up the site, has committed to actively seek interested developers and to facilitate a productive reuse for the site. To stimulate interest, ExxonMobil has conducted an extensive on-site building demolition program that will enhance the market and redevelopment potential of the property. On-site building demolition is typically required only at Superfund sites where it has been demonstrated that hazardous substances are or have the potential to migrate from such buildings or if the buildings impede a response action. ExxonMobil is implementing a site-wide demolition plan to increase the redevelopment potential of the site and provide aesthetic benefits to the site and the community even if there is no presence of hazardous substances.

Results/Anticipated Outcomes: Substantial involvement and support of project stakeholders are important catalysts in the planning and implementation of the ExxonMobil project. The project enhances community and other stakeholder participation in the Superfund cleanup process by providing citizen participation in the process through solicitation of stakeholder input into cleanup alternatives and future use determinations for the site. Establishment of a community panel along with routine communications with the project team resulted in consistently supportive local media coverage and support from the community in project decisions. This project will also demonstrate how the consideration of future uses of a contaminated site in the early cleanup planning stages can be a practical and valuable component of the Superfund process.

ExxonMobil's completion of an on-site building demolition and facilitation of redevelopment *will* provide additional environmental benefits to the community not found in a typical Superfund process. ExxonMobil also purchased the site to help facilitate development. As property owner and the party responsible for cleanup, ExxonMobil has control over redevelopment preparation and final disposition of the site. ExxonMobil will provide EPA a plan that outlines the strategy for facilitating site redevelopment that goes beyond planning and assessment stages.

Transferability: By considering and integrating future use opportunities into the cleanup plan for a Superfund site, the ExxonMobil project will serve as a model for returning Superfund sites back to productive economic use. The project provides an opportunity to analyze an atypical approach to partnering with local community members and other stakeholders to solicit their input throughout the process of selecting and implementing a cleanup remedy and determining future use plans for the site. For communities situated near similarly distressed properties, the ExxonMobil project will explore the potential to improve the health and productivity of a local community by remediating environmental hazards and allowing those communities to reclaim distressed properties as valuable and productive assets.

Stakeholder Involvement in Experimental Projects: Identifying Basic Models

The Challenge(s): Since the inception of Project XL, EPA has stated that meaningful and organized participation on the part of community and national, nongovernmental organization representatives is an important criterion for selecting projects. However, when Project XL was first announced in 1995, EPA did not give specific guidelines for the design of the stakeholder processes. Since the project sponsor, not EPA, is responsible for initiating and maintaining the stakeholder involvement process for projects, EPA left the responsibility for creating models that would meet the stakeholder criterion to those project sponsors. Though sometimes difficult, the experiences of these early projects proved critical to the Agency's understanding of the approaches and resources needed to make the stakeholder process effective.

The Result(s): Project XL has undertaken a commitment to document and evaluate models of stakeholder involvement on an ongoing basis. As a first step, in the report titled Evaluation of Project XL Stakeholder Processes (September 1998), EPA examined four early projects with FPAs: Intel, Merck, HADCO and Weyerhaeuser. As a second step, EPA recently completed a second evaluation of stakeholder processes entitled Project XL Stakeholder Evaluation (August 2000). This report builds upon the earlier report and examines the stakeholder processes used in eight projects: Andersen, Atlantic Steel, Crompton, ExxonMobil, HADCO, Intel, New England Universities Laboratories, and Vandenberg AFB.

The first report found that different models of stakeholder involvement resulted from the original call from EPA for project sponsors to design processes for stakeholder participation. Specifically, the report identified two early models used by the project sponsors: consensus decision making with stakeholders (used by Intel and Merck) and public consultation and information sharing (used by HADCO and Weyerhaeuser). Weyerhaeuser's project was rated as most effective by survey respondents; this project used a public consultation process that relied heavily on longstanding community-company relationships to establish support for the regulatory experiment. The HADCO project was rated least satisfactory on most measures; this project also used the consultation and information sharing process. The two projects using consensus decision-making processes were ranked in between.

In the September 1998 evaluation, neither the consensus decision-making model nor the public consultation and information sharing model was clearly determined to be a superior method of involving stakeholders in the project development process. However, the results did show that clarity of structure and objectives for the process are more important to success and credibility than the type of stakeholder involvement process. The processes that were rated as highly effective, that is, clearly structured with adequate resources, had a combination of broad distribution of benefits (financial, environmental, and public access) among all of the participants and high individual/organizational satisfaction with the outcome of the negotiation. The processes with barriers to participation (such as lack of technical information, unclear objectives, inadequate resources to participate) were rated less satisfactory regarding the distribution of benefits and the outcome. Thus, process satisfaction and substantive results are closely linked—both are critical elements of the success of future projects.

The August 2000 evaluation built upon the original stakeholder evaluation and considered (1) the early dynamics of stakeholder processes in projects developing their FPA, (2) stakeholder satisfaction and effectiveness of stakeholder involvement for projects that had recently signed their FPA, and (3) stakeholder involvement in project implementation for projects that had signed their FPA at least one year before the evaluation. The analysis is based on case studies developed for eight projects. In the projects analyzed, project sponsors developed stakeholder models that centered mainly around public consultation and information. In four projects, sponsors engaged stakeholders in some form of joint-problem solving or consensus, often done in addition to public consultation and information sharing. These included Atlantic Steel, ExxonMobil, Intel, and the national stakeholder process used in New England Universities Laboratories. However, of these, only the Intel project based its stakeholder process on consensus.

- Of those interviewed, most stakeholders were satisfied with the project outcomes and their level of involvement in the stakeholder process regardless of the type of process used. In projects where interviewees were less satisfied with the stakeholder process, the stakeholders' expectations about opportunities to participate went beyond the avenues of participation made available.

- Those projects that typically support a process with satisfied stakeholders tend to exhibit the following characteristics. First, the process involves stakeholders at a level that is consistent with stakeholders' concerns and expectations. Second, the process ensures that stakeholders' perceptions regarding their actual influence over the project outcome match their expectations regarding the level of influence they thought they would have at the start of the project. Finally, the process allows stakeholders to participate efficiently and is not unnecessarily drawn out.

- In addition to factors that determine satisfaction with stakeholder processes, the second stakeholder report also identifies barriers that limit effective stakeholder participation. For stakeholder processes focused on consultation, the amount of time required for stakeholders to participate and their capacity to understand technical issues can influence effective stakeholders involvement. For stakeholder processes centered on information exchange, the greatest barrier to effective participation is the lack of a systematic approach for outreach an obtaining feedback from the community.

Project XL continues to emphasize the principles and process by which stakeholder involvement in projects should be governed, rather than advocating that projects use a single model. By focusing on principles, the sponsors, as the "managers" of the process, can tailor the stakeholder involvement process to reflect the scope and complexity of the project. EPA expects that the design of each stakeholder process adequately reflect a proper balance between the complexity and uncertainty of the project, the stakeholders' desire to participate and have influence over the project, and the project sponsors' ability to direct resources towards stakeholder process development. This also allows the stakeholders themselves to have a say in how the process is structured and conducted.

In addition to emphasizing principles, EPA is beginning to focus on additional resources needed to better ensure the design of effective stakeholder processes. The August 2000 evaluation makes clear that neither project sponsors nor Project XL staff always have the proper experience to effectively design or oversee a stakeholder process. In such instances, project sponsors may design participation processes that lack clear structure and objectives, are reactive rather than proactive, and do not allow stakeholders to participate to the extent they think they should be able. By directing resources to enable the development of more effective stakeholder processes, EPA hopes to ensure that in the future, these pitfalls will be avoided.

Transferability: Project XL's goal is to promote continuous learning and develop a more comprehensive understanding of the factors that contribute to the success of, and that pose challenges to, involving stakeholders in experimental projects. The lessons learned in managing the stakeholder aspects of Project XL are increasingly being shared with other EPA programs and Federal agencies struggling with similar issues. Most recently, Project XL's stakeholder involvement guide was highlighted in EPA's Public Participation Policy Review Workgroup's Report to the Administrator. The previous year, Project XL stakeholder involvement tools and experiences were discussed at the President's Council on Environmental Quality's workshop, "Linking Public Participation to Environmental Decision Making: An Exploratory Workshop." In addition, the program continues to share information throughout the network of EPA staff that have responsibility for various stakeholder involvement efforts.

Multistakeholder Involvement in "Reengineering"

The Challenge(s): Based on strong feedback from Project XL participants, EPA recognized that it needed a more user-friendly process that would be quicker and more cost effective, produce a consistently superior result, and provide more focused stakeholder involvement and information ex-

changes. So, in 1998, EPA sought to improve Project XL using a process developed by corporate America called "business process reengineering."[13] for restructuring of core business processes. Many corporations have found that, over time, core processes within their organization become inefficient, bureaucratic, cumbersome and lose their intended focus. Routine practices often add tasks and steps that do not add value to the core business goal. These inefficiencies slow down the organization, detracting from the intended goals. Therefore, reengineering is most effective in identifying when a particular process is impeding the growth or competitiveness of an organization, or when a particular process is only minimally meeting a business need. A reengineering initiative targets a process and is applied across multiple functions within an organization; must have the support of upper management; and leverages information technologies to overhaul, support, and dramatically improve work processes. Reengineering refers to the major redesign and restructuring of core business processes. The process reengineering model used by EPA was designed to bring about meaningful, lasting change to the Project XL process. EPA convened a workgroup consisting of industry members, nongovernmental organizations (NGOs), state and local regulators, and a community group.[14] Six subgroups were formed, each focusing on a critical Project XL problem. Each subgroup conducted a step-by-step assessment of existing processes and identified inefficiencies and bottlenecks.

Result(s): The reengineering workgroup created a new process that is faster, clearer, and more effective for project sponsors, other stakeholders, and EPA. With the help of a representative group of stakeholders, EPA produced three documents that address the primary concerns of many Project XL stakeholders. Combined, these documents serve to make all aspects of the Project XL process transparent to all Project XL participants, thus promoting understanding, trust, and realistic commitments and expectations. These documents include:

- *Project XL Stakeholder Involvement: A Guide for Project Sponsors and Stakeholders*. This provides helpful ideas and tools to project sponsors and stakeholders for successful interactions. (This guide is further described in the next section below titled "Guidance for Sponsors and Stakeholders.")

- *Manual for EPA Project XL Teams*. This instructs EPA on how to build effective internal teams to develop proposals. (This manual is further described as an Project XL innovation in the section on the core function of "Agency Culture Change.")

- *Project XL: Best Practices for Proposal Development*. This helps project sponsors create effective Project XL proposals. (While very important for Project XL, this type of guidance is not considered an innovation.)

Transferability: The lessons learned from the overall reengineering process, as well as the specific documents produced, are being shared Agency-wide as part of the Stakeholder Action Plan. For example, the *Manual for EPA Project XL Teams* has been distributed to the Reinvention Action Council and shared with the state's environmental commissioners as a model of accomplishing cross-Agency multimedia decision making. In order to share the information with Agency professionals and stakeholders, the stakeholder guide is on EPA's Stakeholder Involvement Web site at *http://www.epa.gov/stakeholders/involvework.htm*.

Guidance for Sponsors and Stakeholders

The Challenge(s): One key challenge early in Project XL was that some industry project sponsors lacked experience with convening and managing a site-specific, intensive stakeholder process, and they feared the inherent costs in time and money to conduct such a process. However, there is reason to believe that the time and money that project sponsors invest in the stakeholder process is less costly than originally perceived and can accrue un-

[13]Business process reengineering as developed by the corporate sector refers to the major redesign and restructuring of core business processes.

[14]The participating organizations were: Citizens for a Clean Environment; City of Portland, Oregon; Dow Chemical; Florida Department of Environmental Protection; Environmental Defense Fund; Environmental Law Institute; Massachusetts Department of Environmental Protection; and Union Carbide. In particular, Union Carbide and Dow Chemical played a leadership role in describing and helping EPA apply the reengineering approach.

expected benefits. At least two private surveys of project sponsors (including project sponsors that were not successful in gaining FPAs) show that their Project XL stakeholder involvement with environmental organizations and community groups has been beneficial to the companies in the long run. The results from one study found that the expense of the stakeholder involvement process is an average of 20 percent of the total transaction cost for the project sponsor—a far smaller proportion than originally assumed.[15] Still, project sponsors looked to EPA for improved guidelines to reduce the early confusion about, and time-consuming nature of, stakeholder involvement procedures.

Another early challenge was that the participation of national NGOs received mixed reviews from the other stakeholders. In some projects, the participation of the national NGOs was consistent, timely, and helped to move the project development process forward. Local stakeholders often gave the national environmental NGOs high praise for being very helpful to local citizens and bringing substantive expertise to the table that local citizens themselves may lack. In other projects, however, the participation of the national NGOs was considered by local citizens to be inconsistent, late, and difficult to predict. In these cases, the NGOs' approach was considered "intervention" and disconnected from local citizen involvement.

In the April 23, 1997, Federal Register Notice, Clarifying the XL Process, EPA took steps to address these issues for the project sponsors, NGOs, and local citizens. In particular, EPA defined three levels of public participation in Project XL[16] to bring clarity to the roles of public stakeholders, to move away from "local citizens versus national environmentalists" clashes, and to enable industry project sponsors to be more responsive. The Federal Register Notice also covered the importance of well-defined and transparent ground rules.[17] However, while the Federal Register Notice helped define the policy issues, project sponsors and stakeholders still sought clear, plain guidelines that could help lead them to successful interactions.

Result(s): A product of the reengineering process, *Project XL Stakeholder Involvement: A Guide for Sponsors and Stakeholders*, clarifies roles and responsibilities of sponsors and stakeholders, suggests guiding principles, and provides ideas and tools to help develop, negotiate, and implement successful projects. It explains the potential benefits of stakeholder involvement to the sponsor as well as to the potential stakeholders. It also explains the EPA and state government roles in assessing the stakeholder involvement process.[18] Ultimately, the stakeholder involvement guide provides general information about the project development process and advice to both stakeholders and potential sponsors regarding how to determine what type of process is appropriate, stakeholder needs regarding time commitment and technical assistance, and the appropriate scope and complexity of the involvement process.

[15]*The Cost of Developing Site-Specific Environmental Regulations: Evidence from EPA's Project XL*, Blackman and Mazurek, Resources for the Future, Discussion Paper 99-35, April 1999.

[16]"Direct participants" are involved in the day-to-day aspects of project negotiations; they influence the design of projects; and their views strongly influence the details and development of the project as well as EPA's ultimate decision to approve or disapprove it. "Commentors" are stakeholders who have an interest in the project but do not participate in day-to-day negotiations; EPA requires sponsors to provide information to potential commentors and create periodic forums in which they can express their comments. The "general public" is involved by having clear access to information on the development and environmental results of the project; EPA expects the project sponsor to arrange public meetings when the information is available, allowing the public opportunities to influence decision making.

[17]Key ground rule topics for consideration include the level of the participant's role (advisory, consultative, or decisional) and how that input should be expressed (i.e., by consensus or majority vote). These topics, as well as other ground rules, must be discussed and consented to by the direct participants.

[18]While the sponsor has the primary responsibility for the stakeholder group, experience shows that in the most successful processes, the sponsor and the stakeholders share in the process creation. EPA will participate as a member of the overall stakeholder group. This participation is important to help ensure that these processes are transparent; it should not be confused with EPA's ultimate role of guaranteeing an adequate stakeholder process to meet Project XL's criterion for public participation. EPA also retains the authority to approve or disapprove a project—based on how well the criteria are met. States also share the ability to veto projects that do not meet the criteria. While this authority is not delegated to stakeholder groups, the views and recommendations of direct participant groups strongly influence the decisions of the regulators.

Transferability: The Project XL Stakeholder Involvement: A Guide for Project Sponsors and Stakeholders is specifically designed to help less experienced project sponsors grasp the essential principles of designing and managing a stakeholder involvement process. Thus, the Guide is featured, along with other documents such as the *Constructive Engagement Resource Guide* (March 1999), in the Agency's Stakeholder Involvement Action Plan (December 1998). Similarly, the Guide is prominent on the EPA Stakeholder Web site. The Web site, a product of the EPA Stakeholder Involvement Action Plan, is designed to share lessons, information, and tools on stakeholder involvement, throughout EPA and with external stakeholders. The Guide is now being widely used by Project XL teams. However, EPA is continuing to encourage the other programs to use the Guide as a model for initiating stakeholder involvement, and will seek to evaluate its usefulness to project stakeholders and sponsors, other industry representatives, and EPA staff.

Capacity and Trustbuilding Resources to Improve Stakeholder Involvement

The Challenge(s): A key lesson from Project XL is that resources may need to be made available to ensure that all stakeholders, particularly local citizens, have the ability to assess the technical and environmental issues. Repeatedly, EPA found that some form of technical assistance and meeting facilitation were necessary to ensure that all participants had the capacity to understand and the willingness to engage in these experimental demonstration pilots. But early on, EPA did not have clear mechanisms or guidelines in place to either assess the needs or supply these resources. EPA needed practical solutions to address the resource gap.

Result(s): EPA strongly suggests that newly formed stakeholder groups perform a "needs assessment" to determine whether training or technical assistance is needed to ensure interest and understanding of all stakeholders in *Clarifying the XL Process and Project XL Stakeholder Involvement: A Guide for Project Sponsors and Stakeholders*. There can be a number of means for local stakeholders to receive technical assistance. For example, the project sponsor, the state government, a national environmental organization or an academic institution might provide technical information or assistance to local stakeholders. However, when these means are not available or appropriate, EPA has set up a mechanism to provide task-specific technical assistance to Project XL stakeholders: the Institute for Conservation Leadership, manages this service under a cooperative agreement with EPA. This assistance is available up to $25,000 per project when requested by the direct participant stakeholder group. This past year, two stakeholder groups involved in the International Paper projects (IP-EI and IP-PEM) accessed the technical assistance grants. In addition, the stakeholder group involved the Andersen project plans to use the technical assistance grant once the project is further along in implementation.

EPA has undertaken other activities aimed at building and maintaining stakeholder trust. In particular, EPA provides contract support for meeting facilitation assistance to project sponsors for initiating a project and determining the best overall stakeholder process. Also, because facilitation by a third party, face-to-face meetings, and site visits stand out as demonstrated mechanisms for building trust, EPA staff actively seek opportunities for scheduling face-to-face meetings and facility site visits.

Transferability: A key action in the Innovations Task Force Report is to "build leadership capacity in communities to participate in local environmental problem solving." EPA will work with the Task Force to incorporate the lessons learned from Project XL regarding how and when to provide key resources into the analysis and recommendations for building local capacity.

Agency Culture Change

A new emphasis on innovation has changed the way EPA thinks and operates, leading to real environmental improvements and real reductions in costs. Regulatory and enforcement programs are still at the core of our environmental system, but innovation has provided new tools to meet future demands. The challenge ahead is to make these innovative ideas a permanent part of EPA's culture. Project XL is one venue through which EPA is learning to change its organizational behavior, particularly to encourage cross-Agency support for innovation. Project XL has led to discreet changes in EPA's planning and operational procedures. These changes support EPA's commitment to test and incorporate innovative solutions to environmental problems. Table 22 describes the planning and management innovations that are leading to change in the Agency's culture.

Senior Management Support and Involvement through the Reinvention Action Council

The Challenge(s): Each of the projects has had varying levels of management involvement at different junctures in the projects' development and implementation. In fact, EPA found that there were many instances where a lack of senior management participation in a project hindered or stopped progress. For projects to develop and system change to occur, there is a need for active support from senior Agency management. This support includes personally championing individual projects, empowering Agency staff that participate in negotiations, giving clear direction to Project XL teams, and providing resources.

Results/Anticipated Outcomes: In early 1996, EPA established the Reinvention Ombudsmen, later called the Reinvention Action Council (RAC), to assist in reaching the Agency's goal of 50 projects. Chaired by the Associate Administrator for the Office of Policy, Economics and Innovation, the

Table 22 : Culture Change Innovations

Project(s)	Media	Innovation
Program wide	Multi-media	*Reinvention Action Council:* Build and maintain support, empowerment, and accountability for projects and innovations Agency-wide.
Program wide	Multi-media	*ECOS-EPA Innovations Agreement:* Expand the potential for state and tribal partnerships for innovative projects.
Program wide	Multi-media	*Cross-Agency Project Teams—the Manual for EPA Project XL Teams:* Offers a model to guide cross-Agency teams in project planning, management, and monitoring.
Program wide	Multi-media	*Compliance Screening Guidance:* Creation of guidelines for Agency screening process for regulatory flexibility projects.

RAC consists of the senior Agency managers (Deputy Assistant Administrators and Deputy Regional Administrators) from each of the Headquarters and regional offices. Originally, the RAC served as a resource to Project XL teams when they faced either disagreements or difficult technical, legal, or policy issues. Since then, RAC members have committed to working directly with Project XL Coordinators within their offices to support quick decision making and ensure that Project XL teams have suitable resources. Involving senior managers has proven to be effective in identifying and resolving problems for Project XL. Building on the Project XL experience, in 1997, the Administrator expanded the RAC responsibilities to support the Agency's overall commitment to reinventing environmental protection.

Transferability: To date, the RAC has taken a hard look at reinvention efforts throughout the Agency and has addressed a broad array of reinvention issues including incentives, permitting, and environmental management systems and continues to set new reinvention priorities. For example, the RAC is the key implementing body of the recommendations from the 1999 EPA Task Force on Innovative Approaches. The RAC's expanded agenda also calls attention to RAC endorsement of innovations throughout the Agency and ultimately serves as encouragement for staff to experiment. The RAC will play a vital role in designing a systematic approach for evaluating and adopting new ideas and building innovation into the work of the Agency.

Managing Experiments in Partnership with State and Tribal Governments

The Challenge(s): Federal sharing of environmental responsibilities requires that each project have the full support of the appropriate state and tribal government. In fact, the state or tribal government is a signatory to most projects. Within the framework of Project XL, EPA, states, and tribal governments are innovatively working together through uncharted territory. In particular, the challenge of developing, refining, and implementing Project XL together has magnified EPA-state, as well as state-state, similarities, differences, agreements, and disagreements. States and tribal governments are, and will continue to be, primary partners with EPA in both regulating public health and the environment and designing and applying innovative approaches. Therefore, it is incumbent that EPA, and state and tribal governments rectify differences and produce agreements that satisfy each entity. Project XL serves as a testing ground for managing experiments to the satisfaction of Federal, state, tribal, and local authorities.

Results/Anticipated Outcomes: The promise of more efficient and effective government has encouraged several states to develop their own Project XL-like legislation providing the authority to test and implement innovative approaches to state environmental programs. To provide an additional vehicle to test innovative environmental management strategies for the future, EPA and the Environmental Council of the States (ECOS) negotiated an agreement to guide environmental regulatory innovations in the future. The ECOS-EPA Innovations Agreement was developed as a result of the Project XL experience. The agreement defines seven principles to guide regulatory innovations and a process that clarifies how EPA and states will put these good ideas to the test. As of August 2000, the ECOS-EPA Innovations Agreement was moving forward with three projects in implementation and five additional projects having preliminary approval.

Transferability: As Project XL closes in on its 50 project milestone, two things are clear: (1) EPA will continue to test innovative ways of achieving desirable environmental outcomes that are more supportive of the marketplace and business needs than the current system and (2) state and tribal governments will continue to be partners in achieving these outcomes. The prominent role of states in the Project XL process, as well as the ECOS Innovations Agreement, has advanced Federal-state partnerships in developing and managing innovation strategies for environmental protection. The experiences of Project XL continue to influence states as they consider, develop, or expand their own programs that offer regulatory flexibility to facilities or industry sectors. For example, Project XL is being used as a tool by New Jersey as it thinks about expanding its regulatory reinvention program. As the idea of testing tomorrow's solu-

tions today spreads throughout state and tribal governments, Project XL will continue to serve as a viable model. Additionally, in fulfilling the principles of the Joint State/EPA Agreement to Pursue Regulatory Innovation, a number of states have entered into Memorandums of Agreement to pilot and evaluate innovative environmental regulatory methods.

Effective Cross-Agency Teams for Multimedia Experimentation

The Challenge(s): To institute change within an agency requires creating guidance and procedures for staff action. Projects often test innovations that cut across traditional EPA media programs (e.g., air, water, waste and toxics), which have their own regulations, budgets, policies and procedures. Projects are region-led, but typically involve national policy issues that require regions and Headquarters' offices to coordinate. Initially, a lack of such coordination was a major challenge with Project XL, and a major factor in the high transaction costs of participation for EPA and its Project XL partners.[19]

Projects require prompt and effective cooperation among various EPA offices in order to properly address project sponsor proposals. Normally, project proposals impact multiple Agency functions, so EPA staff experts are convened who (1) do not normally work together, (2) answer to separate and independently managed "chains-of-command," and (3) have different priorities (e.g., responsibilities for separate statutes and programs that face very different time, policy, legislative, and budget constraints).

Results/Anticipated Outcomes: To carry out the Project XL experiments, EPA had to evaluate its history and effectiveness of working across media doing a major Project XL reengineering[20] effort. In order to allow EPA to quickly make decisions across Program Offices, speak with one voice to project sponsors, and share a common understanding of the project at hand, EPA created a new paradigm for Project XL cross-Agency teams. This new paradigm is defined in the *Manual for EPA Project XL Teams*. The Manual has a detailed outline of the proposal development process, and clarification of roles and responsibilities among EPA media offices, enforcement staff, and senior managers. These clarifications are helping new Project XL teams make decisions faster and communicate with project sponsors more clearly and decisively. The Manual also explains that the EPA teams are required to have a project schedule for all new projects to help keep the team focused on key milestones and on track. In addition, another tool EPA has designed to assist each new Project XL team is the option of having a neutral facilitator kick off the proposal development process and guide the EPA staff in setting the foundation for an open, productive decision-making process.

These Project XL teams are continuing to make key decisions in the Project XL process faster. This is more satisfying to participants both outside and inside the Agency. For example, involving key Agency decision makers early in the process and improving the functioning of the cross-Agency team has paid off in the complex Atlantic Steel project. Several of the streamlined techniques were applied resulting in an agreement on the project's Phase One signed by the sponsor and EPA nine months after initial discussions began—a marked improvement over earlier proposals, some of which lingered more than 24 months without closure. EPA's track record for shortening the timeframe involved in developing agreements after sponsors initially submit their proposals continues to improve. Examples of projects that have accomplished this in 12 months or less include Progressive, Louisville POTW, Denton POTW, and USPS Denver.

Transferability: EPA will continue to monitor the effects of these process improvements and the related transaction costs. Currently, EPA is finalizing an economic analysis framework for Project XL (to be completed 2001). The framework will develop an analysis plan that will permit effective evaluation of the financial costs and benefits ac-

[19]See *Evaluation of Project XL Stakeholder Processes* prepared by Resolve, Inc., for EPA (September 1998, EPA-100-R-98-009) and *The Cost of Developing Site-Specific Environmental Regulations: Evidence from EPA's Project XL*, Blackman and Mazurek, Resources for the Future, Discussion Paper 99-35, April 1999.

[20]See page 75 for description of the Project XL reengineering effort.

cruing to projects. Ultimately, as part of a sampling plan, the information on transaction costs and project benefits for facilities, EPA, and other stakeholders will be collected. The sampling plan will first focus on the Weyerhaeuser and the NYSDEC projects. EPA will use this information to continue to improve Project XL and to help design the next phase of experimentation in the Agency.

As EPA continues to test new approaches to solving environmental problems, the solutions increasingly cross traditional media program lines. The lessons learned and new tools developed for Project XL teams are now widely available for other reinvention initiatives that cross the traditional Agency structure and require cross-Agency team building. Current and future reinvention efforts can now start with a blueprint for avoiding many of the problems inherent to cross-Agency team building and use tools that focus these new teams on their shared goal of cleaner, cheaper, and smarter environmental protection.

Compliance Screening for Project XL's Voluntary Project Sponsors

The Challenge(s): Agency guidance on critical program components is needed by project sponsors to optimize the effectiveness of the Project XL experimental process. EPA actively encourages a wide variety of public and private entities to participate, but all project sponsors must have a good history of compliance with EPA regulations. A potential sponsor's overall compliance history is relevant to ensure the experimental Project XL approach will not pose undue risks to human health and the environment, and to enable EPA to make an informed judgement regarding the likelihood of the participants ability to achieve superior environmental performance. As the Project XL process matured, compliance screening became more frequent and time-intensive and the screening process continued to lack definition. Clear compliance screening practices and expectations needed to be established.

The Result: OECA developed the *Guidance for Compliance Screening for Project XL* in 1998 to standardize and streamline compliance screening. This compliance screen provides the Agency with useful information on a participant's current compliance status and history. It also provides factors that could bear on a potential participants eligibility for Project XL, such as the possibility of a conflict between a proposed project and an ongoing enforcement effort. The guidance specifies the scope, criteria, and process for conducting enforcement screens and indicates that compliance screens will be updated prior to high-visibility public events.

Transferability: Project XL is one example of a shift in our national strategy for protecting the environment. Increasingly, EPA is trying to achieve its mission through building partnerships with small and large businesses, citizen groups, state and local governments, and institutions. The Project XL screening guidance is a program-specific application of the broader framework, and an example of a rigorous screening process for a regulatory flexibility program. Project XL has helped lay the groundwork for testing and establishing guidance for an increasing number of EPA voluntary programs requiring compliance screening. In addition to the Project XL screening guidelines, on April 5, 1999, OECA and the Office of Reinvention issued the *Guidance for Compliance Screening for Voluntary Programs*, the Agency's comprehensive screening framework, applicable to all voluntary partnership programs.

Emerging Innovations

This section catalogues 23 emerging innovations—promising ideas and concepts, that as of November 2000, were in earlier stages of exploration. These expected innovations are being provided here in order that future project sponsors and stakeholders have a more complete picture as to the experiments underway. As these innovations move forward, the Agency will be tracking and assessing the results in future reports.

The table immediately below identifies the types of emerging innovations represented by each project. This table is designed to give the reader a "roadmap" for this section. It is not intended to be used as a checklist for future projects.

Emerging Innovations in Core Functions—Projects Newly Underway or Under Development

	Regulations	Permitting	Information Management	Enforcement Compliance	Environmental Stewardship	Stakeholder Involvement	Culture Change
Anne Arundel County	X						
Autoliv	X						
Buncombe County	X						
City of Chicago Development Zones	X						
Clermont County					X		
Columbus					X		
Crompton TBT					X		
Puget Sound				X			
Kodak					X		
Fort Worth					X		
IBM Fishkill	X						
Labs21					X		
Lead Safe Boston	X						
Chicago POTW	X						
NBC POTW	X						
NASA			X				
New Jersey Gold Track				X			
Ortho-McNeil Pharmaceutical					X		
Pennsylvania DEP		X					
Port of Houston Authority				X			
PPG					X		
United Egg Producers		X					
USFilter	X						
Virginia Landfills	X						
Yolo County	X						

Table 24: Emerging Innovations in Regulations

Innovations	Media
Anne Arundel and Buncombe County —Testing Bioreactor Methods: Recirculating Leachate over Alternative Liners	Solid Waste
Autoliv—Enabling Metals Recovery from Pyrotechnic Material	Hazardous Waste
Chicago Regional Air Quality and Economic Development Project	Air
IBM Fishkill—Using F006 Wastes as an Ingredient in Cement Production	Hazardous Waste
Lead Safe Boston—Lead-based Paint Debris Disposal Flexibility	Hazardous Waste
Chicago POTW—Alternative Effluent Discharge Monitoring	Water
NBC POTW—Enhancing the Metal Finishing 2000 Program	Water
US Filter—Encouraging Metals Recycling and Recovery	Hazardous Waste
Virginia Landfills—Testing the Bioreactor Methods: Comparing a Leachate Recirculation System to the Introduction of Additional Liquid Amendments in Sanitary Landfills	Solid Waste
Yolo County—Testing a Bioreactor Method: Aerobic versus Anaerobic Technology	Solid Waste

Anne Arundel and Buncombe County—Testing Bioreactor Methods: Recirculating Leachate over Alternative Liners. Both Anne Arundel County in Maryland and Buncombe County in North Carolina are seeking flexibility to recirculate leachate and/or gas condensate over an alternate composite liner and collection system not constructed as prescribed in the Resource Conservation and Recovery Act (RCRA). Anne Arundel County is interested in effectively increasing its landfill waste capacity while decreasing the concentration of leachate and reducing the amount of leachate requiring pretreatment and being discharged to the local wastewater treatment plant. After design and construction of a small bioreactor test area, liquid will be injected over a four- to seven-year period through injection devices. To improve the evaluation of different infiltration systems, the test area will contain both vertical injection wells and horizontal injection trenches. Settlement resulting from accelerated waste decomposition will be monitored using settlement plates.

For its project, Buncombe County is looking to improve leachate quality and accelerate waste decomposition and landfill gas generation. Recirculating leachate over a specific section of its landfill will accelerate decomposition of its waste and shift that waste to a more benign state. More rapid decomposition will also compress the time landfill gas is generated, reducing emissions and making gas recovery more efficient. To measure how this alternative approach can provide superior environmental performance, the county would provide a baseline estimate of current conventional sanitary landfill maintenance. It is anticipated that the county will quantify the benefits of the project against this established baseline.

Autoliv—Enabling Metals Recovery from Pyrotechnic Material. Autoliv ASP (Autoliv) manufacturers automobile safety products, including the pyrotechnic (explosive) materials used to deploy air bag inflators. During the manufacturing of these materials, reactive hazardous wastes are generated. These wastes are presently treated off site at a RCRA permitted treatment storage and disposal facility (TSDF) that accepts hazardous waste from outside sources and treats it via open burning. Autoliv currently operates a highly advanced metals recovery facility (MRF) designed to process and recover aluminum and steel from unfired air bag inflator units as well as previously

fired inflator units. The MRF has an extensive air pollution control train that is capable of capturing emissions produced by the waste pyrotechnic material. Autoliv proposes that the technology and pollution control devices used in the MRF be adapted to process their waste pyrotechnic materials on-site rather than sending the materials off-site to a TSDF for open burning. Autoliv is seeking permitting flexibility under RCRA to be able to modify their MRF operations and effectively treat and dispose of this pyrotechnic material.

Chicago Regional Air Quality and Economic Development Project. The City of Chicago's Department of Environment is seeking to exercise a seldom used section [Section 173(a)(1)(B)] of the Clean Air Act (CAA) that will create innovative criteria to promote clean air and economic development in urban areas. Section 173(a)(1)(B) allows the EPA Administrator, in consultation with the Secretary of Housing and Urban Development, to identify zones in which economic development should be targeted. Chicago has dubbed such areas "development zones." A development zone would generally be defined as an area that needs economic development and that advances environmental improvements, particularly concerning clean air. Chicago, U.S. EPA, and Illinois EPA will develop criteria that an area must meet to be designated as a development zone. Under this livability-focused project, a new or modified major stationary source (facility) that locates in a development zone (within the Chicago CAA nonattainment area) would draw emission reductions from a growth allowance generated from the state's emission inventory—a structure to be approved by the U.S. EPA and Illinois EPA. This growth allowance would be used in lieu of obtaining emission offsets required under CAA—New Source Review. The growth allowance would be created using emissions reductions generated by Chicago and other municipalities and would be made available to companies who locate in the development zones.

IBM Fishkill—Using F006 Wastes as an Ingredient in Cement Production. The IBM Fishkill project proposal will help examine the need for RCRA regulation of a subset of recycling scenarios involving the production of products used on the land. Through Project XL, IBM Fishkill is seeking an exclusion for the use of the electroplating wastewater treatment sludge (i.e., F006) as an ingredient in the production of cement. Under current regulations there is an exclusion for hazardous secondary materials that are properly recycled through use as an ingredient to produce a product. However, this exclusion is not available if the product being produced is to be used on the land (or burned for energy recovery). Therefore, even though the sludge can be recycled as an ingredient in cement (F006 typically has high concentrations of calcium, needed in producing cement), it remains subject to full RCRA regulation, including storage permits and hazardous waste manifests.

Lead Safe Boston—Lead-based Paint Debris Disposal Flexibility. Lead Safe Boston is seeking to allow less expensive handling and disposal of lead-based paint (LBP) architectural debris from residential units. The Lead Safe Boston program currently requires toxicity characteristic leaching procedure (TCLP) lead testing on architectural debris before disposal for all projects in accordance with Massachusetts and EPA regulations. The results of this analysis determines if waste is to be classified and disposed of as hazardous or non-hazardous. When lead waste exceeds EPA limits of toxicity for disposal as construction debris, it is disposed of as hazardous waste. Disposal for classified hazardous waste is costly. TCLP testing can be costly and time consuming as well. Lead Safe Boston is seeking the flexibility to use provisions of the RCRA Household Hazardous Waste Exclusion (HWE) rule for LBP debris. This exclusion would allow household LBP debris to be disposed of in a municipal solid waste landfill that meet certain minimum criteria for liners, leachate collection, and groundwater monitoring. Anticipated cost savings from the flexibility (270 percent reduction in average disposal costs per project) would enable Lead Safe Boston to remove lead from an additional 12 residential units.

Chicago POTW—Alternative Effluent Discharge Monitoring. The Metropolitan Water Reclamation District of Greater Chicago (Chicago POTW), one of the largest publicly owned treatment works (POTW) in the country, requested regulatory flexibility from the Clean Water Act (CWA)

oversight requirements (i.e., inspection and sampling) of the General Pretreatment Regulations pertaining to discharges from small (de minimus) categorical industrial users (CIUs) into the Chicago POTW's water reclamation plants. The Chicago POTW project will test several ideas. First, Chicago POTW has proposed a new definition of "de minimus" significant industrial user (SIU), using criteria specific to their location. Second, Chicago POTW, with EPA and Illinois EPA, will develop Toxic Reduction Action Plans to identify priority pollutants that are present in quantities that may pose an environmental risk but are not currently subject to regulation. Third, Chicago POTW would like to build on its experiences with the Common Sense Initiative's[21] Strategic Goals Program (SGP) to create strategic performance partnerships (partnerships) with metal-finishing facilities that fully achieve the individual facility goals outlined in the SGP. Under these partnerships, Chicago POTW will work cooperatively with demonstrated sector leaders to develop, test, and implement an alternative measurement system for demonstrating environmental performance. Under current pretreatment regulations, SIUs must conduct self-monitoring according to EPA sampling protocols, typically involving "end-of-pipe" sampling of effluent. Possible alternative monitoring in the Chicago project would use statistical process control data collected by the SIU that would provide more precise performance and product quality data than traditional monitoring data.

NBC POTW—Enhancing the Metal Finishing 2000 Program. The Narragansett Bay Commission POTW (NBC POTW), located in the metropolitan areas of Providence and Blackstone Valley, Rhode Island, is working to improve the environmental performance of a select number of metal finishing facilities. NBC POTW wants to establish incentives that promote and reward superior performers and focus compliance and technical assistance on problem performers. In 1994, NBC POTW developed a pollution prevention integration program, NBC Metal Finishing 2000, to test new approaches to improve environmental compliance by the local industrial community. Specifically, NBC POTW proposal asks for the flexibility to reduce self-monitoring requirements and inspections for top performing industrial users (IUs) so staff can focus on problem IUs. Problem IUs would be identified and given increased oversight in addition to pollution prevention technical assistance. This project would define quantitative performance criteria for NBC POTW's metal finishing facilities and measure the effect of this new approach using performance indicators. To implement the project, NBC POTW is seeking regulatory flexibility that will allow them to (1) replace categorical and mass-based standards with more stringent local limits specifically designed to protect the facilities' operations and (2) eliminate certain categorical monitoring requirements for pollutants not present based on a facility's non-use of certain raw materials.

USFilter—Encouraging Metals Recycling and Recovery. US Filter Recovery Services (US Filter), a fully permitted hazardous waste treatment and storage facility in Roseville, Minnesota, is proposing to install its resin regeneration system in customer businesses—such as metal finishers or printed circuit board manufacturers—that totally deionizes rinse waters containing F006 wastes, making it available for reuse. Rather than sending rinse waters to local POTWs, USFilter's customers would increase recycling, promote recovery, conserve water, and reduce the use of hazardous chemicals. The resin regeneration system consists of ion exchange canisters that USFilter would install on customer's process lines that contain wastewaters. Once diverted into the canisters, the metals in the wastewater will adhere to the resin material in the canister, rendering the water free of metal contaminants. The water can then be reused in the customer's process lines. Once the resins are spent, these canisters can be replaced by US Filter, who then regenerates the resins. This potentially allows the metals to be reclaimed rather than land disposed. Excluding ion exchange canisters from some or all RCRA hazardous waste requirements could promote improved electroplating sludge management. In place of existing RCRA regulatory requirements, the USFilter proposal asks participants to manage the F006 (electroplating sludge)

[21]EPA launched the Common Sense Initiative in 1994 with the broad purpose of seeking "cleaner, cheaper, and smarter" sector-based approaches to protecting human health and the environment, and has been a primary component of EPA's regulatory reinvention efforts.

wastestreams in accordance with alternative management requirements.

Virginia Landfills—Testing Bioreactor Methods: Comparing a Leachate Recirculation System to the Introduction of Additional Liquid Amendments in Sanitary Landfills. This proposal encompasses two separate Waste Management landfill sites in Virginia that are being considered together as part of one larger project. Waste Management will implement two slightly different waste treatment systems at the sites. One site (Maplewood Landfill in Amelia County) will recirculate leachate to provide moisture. The other (King George County) will introduce additional liquid amendments (graywater, stormwater) to its landfill. In addition to implementing two different waste treatment systems, the project will compare the performance and results achieved at the two sites (biodegradation potential, methane generation, settlement, landfill capacity extension) and examine the costs and benefits associated with each treatment method. To be able to apply liquids other than leachate or gas condensate to the King George system, Waste Management is requesting flexibility from current RCRA requirements.

Yolo County—Testing a Bioreactor Method: Aerobic versus Anaerobic Technology. The Yolo County Bioreactor Landfill (Yolo County), located in California, will operate its next landfill module as a controlled bioreactor landfill. To do this, Yolo County is seeking flexibility from RCRA restrictions that preclude the addition of bulk or non-containerized liquid amendments (graywater, septic water) to landfills. The bioreactor method accelerates waste decomposition and leachate treatment via the addition of liquid amendments through a network serving the waste mass. This process is designed to accomplish a more rapid completion of composting, waste stabilization, and methane generation than in a conventional landfill. The Yolo County proposal plans to physically subdivide the landfill module and operate it as both an anaerobic and aerobic bioreactor. The aerobic bioreactor differs from an anaerobic one in being a process of "landfill-based composting." For the aerobic half of the module, atmospheric air will be delivered to the waste in addition to liquid. This air will in effect dry out the waste mass. The amount of liquid added to the aerobic part of the module will then be increased to accommodate any drying effects. The aerobic bioreactor will not create methane but will degrade significant waste fractions such as lignin and leachate chemical oxygen demand (COD) components.

Table 25: Emerging Innovations in Permitting

Innovations	Media
Pennsylvania DEP—Investigating an Alternative Approach to Promoting Coal Remining	Water
United Egg Producers—Environmental Management Systems/Third-Party Certification	Water

Pennsylvania DEP—Investigating an Alternative Approach to Promoting Coal Remining. The Pennsylvania Department of Environmental Protection (Pennsylvania DEP) is exploring an alternative approach to improve overall in-stream water quality by reducing mine drainage and reclaiming scarred lands resulting from abandoned coal mines in Pennsylvania. Pennsylvania DEP will develop a new approach to promoting coal remining based on compliance with best management practices (BMPs) instead of National Pollutant Discharge Elimination System (NPDES) numeric effluent limitations. The CWA NPDES permits for remining currently establish site-specific numeric effluent limitations representing best available technology. To implement its alternative permit approach, Pennsylvania DEP is exercising enforcement discretion to provide that reminors may comply with non-numeric limitations in the form of specific BMPs as well as in-stream monitoring requirements to measure the performance of remediation activities on in-stream water quality.

United Egg Producers—Environmental Management Systems/Third-Party Certification. The United Egg Producers (UEP), a farmer cooperative representing egg producers nationwide, is seeking the capability to operate under a statewide permit rather than a facility specific NPDES permit as required under the CWA. A significant portion of the farms that the UEP represents are classified as Concentrated Animal Feeding Operations (CAFO), which must obtain individual NPDES permits for their activities. If these farms were allowed to operate under a statewide general permit, it would significantly reduce compliance costs for these UEP farms. In exchange for the reducing the permitting burden, these UEP farms would achieve "zero discharge" status through the development of a comprehensive environmental management system (EMS). Furthermore, UEP proposes to establish an EPA-approved third-party certification program that would be required to verify individual EMS's and the zero discharge status among CAFO operations. This new streamlined permitting would alleviate the pressure on states to perform inspections on the egg industry, expedite the permitting process for egg producing facilities, help ensure continuing compliance, and achieve superior environmental performance.

Table 26: Enforcement and Compliance Assurance Innovations

Innovations	Media
Puget Sound—Integrated Marine Environmental Compliance Program	Water
New Jersey Gold Track—Performance-based Approaches to Environmental Management	Multi-media
Port of Houston Authority—Port/Tenant Environmental Management Programs	Water

Puget Sound—Integrated Marine Environmental Compliance Program. Using the Project XL/ENVVEST process, the Puget Sound Naval Shipyard (Puget Sound) in Bremerton, Washington, is proposing to develop and demonstrate an alternative, long-term, cost-effective strategy for protecting and improving the health of Sinclair Inlet. The Puget Sound project is intended to achieve its objectives through the use of sound ecological science and risk based management, employing approaches consistent with the draft EPA Ecological Risk Assessment Guidelines. It will demonstrate concepts currently under development for naval shipyards by marine scientists at the Naval Command, Control, and Ocean Surveillance Center. While retaining Puget Sound's existing pollution control baselines as the floor, existing permits would be revised to replace traditional narrowly focused monitoring, compliance, and reporting requirements with innovative monitoring programs and pollution prevention measures that are anticipated to achieve better environmental results.

New Jersey Gold Track—Performance-based Approaches to Environmental Management. The New Jersey Department of Environmental Protection (New Jersey DEP) envisions the Gold Track as a multimedia program that will move away from a front-end review and approval process toward back-end monitoring while tracking and maintaining a cost-effective high level of public health and environmental protection. Gold Track is as an enhancement of the state's Silver Track Program, New Jersey DEP's first step toward implementing a regulatory structure that is accountable, measures environmental performance and provides operational flexibility. The premise of Gold Track is that different levels of environmental performance warrant varying degrees of regulatory oversight and flexibility. The Program is being designed to require increased levels of commitment in return for increased regulatory flexibility for qualifying entities based upon their demonstrated capability and environmental performance. The New Jersey Gold Track proposal plans to use media-specific addenda to define specific state and Federal flexibilities to be granted to program participants. Each addendum would be negotiated separately—the first addendum for the project would be air specific—and would define flexibility granted, superior environmental performance gained, and the evaluation process used to judge the effectiveness and benefits of the flexibility.

Port of Houston Authority—Port/Tenant Environmental Management Programs. The Port of Houston is a 25-mile-long complex of diversified public and private facilities. The Port of Houston Authority (PHA) is authorized by Texas law as an autonomous governmental entity that acts as a landlord for port tenants. Additionally, the PHA may be subjected to enforcement actions for tenant violations of environmental regulations. The PHA project proposal seeks to test the benefits of providing regulatory flexibility in exchange for a tenant environmental management program designed to improve compliance. To improve tenant compliance, the PHA would develop a compliance manual that contains guidelines describing the roles and responsibilities of key members of the port staff. Specifically, the guidelines will include environmental compliance procedures and an environmental regulatory matrix that summarizes federal, state, and local regulations that affect operations at the PHA. PHA's proposal also establishes a compliance baseline and has set a goal for 20 percent improvement in compliance. In exchange, the PHA is seeking regulatory flexibility to minimize the liability/compliance obligations of a landlord port for acts and omissions of their tenants.

Table 27: Emerging Innovations in Environmental Stewardship

Innovations	Media
Clermont County—Community-based Watershed Protection	Water
Columbus—Enhancing a Local Lead Hazard Program	Hazardous Waste
Crompton TBT—Flexibility in the Tributyltin Monitoring Program	Water
Kodak and PPG—Pollution Prevention Assessment Framework (Developing Environmentally Preferable Products In the Chemical Industry Through Technology Transfer)	Hazardous Waste
Fort Worth—Proactive Demolition of Structures Containing Asbestos	Air
Labs21—Increased Efficiency in Lab Operations	Water
Ortho-McNeil Pharmaceutical—Catalytic Oxidation of "Mixed Waste"	Hazardous Waste

Clermont County XLC—Community-based Watershed Protection. Clermont County, Ohio, (Clermont County) is developing a community-designed watershed management plan consistent with its goals of improving water quality in the Little Miami River Watershed while maintaining opportunities for economic growth. To improve water quality and encourage all polluters to share in the necessary expense, Clermont County seeks to develop and apply locally developed water quality standards that are based on local environmental conditions while employing a collaborative goal setting approach for managing its resources. This project will develop an environmental protection plan to integrate Clermont County's watershed management plan into a broader state plan administered by the Ohio Environmental Protection Agency (OEPA). Clermont County will develop a sampling and monitoring program and a computer-based watershed model as part of its watershed management plan. Sampling and monitoring will allow the compilation of data on existing environmental conditions in the watershed and help assess the effects of point and non-point source pollution. Computer modeling will enable predictions of the impact land management policies will have on the watershed. As an incentive to encourage non-point source reductions, Clermont County's watershed management plan could use an effluent trading system in which pollution credits may be exchanged among point and non-point source polluters. Clermont County is seeking flexiblity under the NPDES permit system to provide time to study and analyze watershed conditions in order to prepare the watershed management plan. Flexibility may also be needed in considering the development of a point/non-point effluent trading system.

Columbus—Enhancing a Local Lead Hazard Program. The City of Columbus' Division of Water (Columbus) is pursuing a means to increase the funds needed to implement a comprehensive Lead-Safe Columbus Program (LSCP) to identify and reduce lead hazards. The LSCP would be an lead abatement alternative to the Lead and Copper Rule (LCR) requirements for testing and replacement of lead service lines (LSLs). Specifically, Columbus seeks a three-year window of regulatory flexibility from LSL testing requirements in the Lead and Copper Rule, which was promulgated under the Safe Drinking Water Act. As long as the conditions of this flexibility are met, Columbus will give $300,000 a year for 15 years to the Columbus health department to fund the LSCP. These funds will allow the LSCP to provide greater public health protection from lead exposure in Columbus' community than would be obtained by strict adherence to the LCR requirements. The scope and breadth of the LSCP would enable it to proactively identify and prevent potential lead hazards. LSCP interventions will be developed for children most at risk for lead poisoning and targeted at those exposure pathways that would have the greatest impact on a child's body-lead burden.

Crompton TBT—Flexibility in the Tributyltin Monitoring Program. The Crompton TBT proposal focuses on eliminating water monitoring requirements for the Crompton Corporation. Crompton is a major manufacturer of tributyltin (TBT), a compound used in producing paint coatings for marine vessels. TBT-based paints assist in keeping ship hulls free of marine organisms by acting as a biocide and as an agent that introduces a "self-polishing" quality to marine paints. TBT-based paints contain toxic substances and have the potential to affect non-target marine organisms in the vicinity of shipyards and marinas. In 1989, pursuant to the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), EPA issued a data call-in (DCI) to Crompton, which required the company to measure, for 10 years, the effectiveness of regulations in reducing tributyltin concentrations in water columns, sediments, and marine organism tissue at certain specified areas of the Great Lakes and the intercoastal waterways of the United States. The 1989 DCI mandated the collection and generation of a significant amount of data and documentation. For example, the company's annual report, which only summarizes the end results of the monitoring program, is typically more than 3,000 pages long. To date, Crompton has gathered over seven years of data. These data from Crompton and other TBT-manufactures have shown a downward trend in TBT concentrations. Given that trend, Crompton is seeking to eliminate the monitoring requirements mandated by the 1989 DCI and to use the resulting cost savings to decrease emissions of hazardous air pollutants (HAPs) and volatile organic compounds (VOCs) at Crompton's Taft, Louisiana, plant by 15 percent.

Kodak and PPG —The Pollution Prevention Assessment Framework (Developing Environmentally Preferable Products in the Chemical Industry Through Technology Transfer). Eastman Kodak (Kodak) and PPG Industries (PPG) are applying the EPA Pollution Prevention Framework (Framework) to design and develop new chemicals. Use of the Framework can yield safer new chemicals, stimulate reformulation of existing products, and reduce generation of hazardous wastes. The Framework is a set of computer models, developed by EPA's Office of Prevention, Pesticides, and Toxic Substances, that predicts risk related properties of chemicals where data are limited. The models derive risk information based on chemical structure to promote pollution prevention and improve product design and stewardship. The Framework can be used to estimate physical-chemical properties, environmental fate, and hazard to humans and aquatic life. Use of the Framework will enable the companies to submit chemicals that are on average less toxic than those from a development cycle with no assessment feature. Both Kodak and PPG XL projects involve the use of this chemical risk screening early in the product development cycle. Kodak and PPG are seeking regulatory flexibility under the premanufacture notice (PMN) provisions of the Toxic Substances Control Act (TSCA). Under Project XL, Kodak and PPG will be allowed to manufacture PMN chemicals in 45 days, rather than after 90 days as is currently required under the TSCA. This flexibility will apply only to lower risk chemicals that will generally have been assessed by EPA within 25 to 28 days. Both PPG and Kodak will disseminate information about the Framework to other chemical companies and industries. PPG will publish a validation study to verify the accuracy of selected Framework models. Kodak will complete an environmental cost accounting study that will describe the economic and business benefits that result from use of the Framework. Kodak will also complete a study identifying management practices that facilitate pollution prevention outcomes.

Fort Worth, Texas—Proactive Demolition of Structures Containing Asbestos. The City of Fort Worth's proposal features an alternative method for the demolition of structures that have asbestos-containing building materials (ACBM) but that are not in danger of imminent collapse. Essentially, Fort Worth is seeking the regulatory flexibility to demolish substandard structures not in danger of imminent collapse similar to the shortened procedure that exists for structures that are in imminent danger of collapse. In place of the current CAA National Emission Standards for Hazardous Air Pollutant (NESHAP) requirements for the regulated asbestos-containing materials (RACM) in structures, Fort Worth would test its own process for managing HAPs. This "Fort Worth" method integrates "wet" demolition methods, air monitor-

ing, and proper handling/disposal techniques to test if their method with RACM left in place is at least as protective as demolition with the RACM removed. The Fort Worth method will create significant cost savings for performing environmentally sound proactive nuisance demolitions allowing local governments to tackle the problem of urban blight more successfully by performing more demolitions.

Labs21—Increased Efficiency in Lab Operations: The Labs21 proposal endeavors to encourage laboratory owners, operators, and designers to improve their energy efficiency and water conservation with a new laboratory management approach. This agreement would function as an umbrella final project agreement (FPA), and does not describe any specific federal regulatory flexibility. These flexibilities would be agreed upon at a later date and would attain measurable superior environmental performance beyond what is achieved by labs under current federal and state regulatory systems. Using the Labs21 approach, EPA and DOE estimate that laboratories can decrease energy consumption by 60 to 75 percent. EPA has applied the Labs21 approach to an existing EPA laboratory and expects to reduce its annual electric demand by 68 percent and its utility costs by almost 75 percent. Assuming that only 25 percent of U.S. laboratories achieve a 60 percent reduction in energy consumption, the United States would reduce its annual energy consumption by an amount equivalent to the yearly energy consumption of 840,000 U.S. households and save $1.25 billion dollars. In the future, as laboratory energy efficiency improves, Labs21 will focus on even more aggressive pollution prevention goals and strategies unique to each type of laboratory.

Ortho-McNeil Pharmaceutical—Catalytic Oxidation of "Mixed Waste." Ortho-McNeil Pharmaceutical (OMP), in conjunction with the R.W. Johnson Pharmaceutical Research Institute (PRI), uses radio-labeled compounds for pharmaceutical research and development. This manufacturing process yields a waste solution containing both radioactive material and an organic compound, which constitutes a low-level "mixed waste" under RCRA. Ortho-McNeil is proposing to use an on-site bench-top catalytic oxidation process to treat the mixed waste, which would use a more efficient, environmentally safe process as compared with current off-site waste management and disposal practices. The oxidation treatment process destroys the hazardous organic component of the mixed waste, transforming it into a relatively innocuous low-level radioactive waste that is easily stabilized. This oxidation process meets the RCRA definition of "treatment," requiring a TSDF permit under RCRA. To use catalytic oxidation as an on-site treatment alternative, EPA will grant OMP and PRI a conditional exclusion from the RCRA hazardous waste definition for the organic component of its process waste solution.

Table 28: Information Management and Access Innovations

Innovations	Media
NASA—Realtime Web-based Information Management	Multi-media

NASA—Real-time Web-based Information Management. The National Aeronautics and Space Administration (NASA) White Sands Test Facility proposes to implement an extensive Web-based information management and regulatory reporting system that will provide EPA and multiple state agencies from New Mexico real-time access to reports and information. This system will save resources, including document preparation time, white paper usage, and triplicate reproduction requirements. A Web-based system will have several benefits over the existing reporting system which is largely paper-based. Web-based information management will provide more real-time, user friendly data. This will enhance communications with other agencies by providing immediate access to detailed environmental compliance information including graphical illustrations of current conditions, access to the groundwater monitoring database system, and an electronic archival of historical documentation. In turn, NASA seeks regulatory flexibility from certain reporting requirements specified in site-specific regulatory documentation and permits. The information contained in the NASA Web-based system would be sufficient to satisfy current regulatory requirements; only the format, delivery method, and data archival procedures would be modified.

Building a National Laboratory for Innovation

With experiments now underway, we are carefully watching the results. This is an important step if we are to progress toward our ultimate goal—scaling up successful concepts and approaches for broader application. We know that in order for these experiments to realize their true potential, we must use what we learn to make improvements in our national programs. In some cases, existing policies and regulations may have to be adapted to reflect more up-to-date knowledge and technology.

As highlighted in "Learning From Experiments," some innovations are already being adopted into our system of environmental protection for everyone's benefit. Some innovations are still emerging, yet throughout the process for developing these experiments, even projects that are very early in the implementation stages have highlighted opportunities for EPA to adopt fresh, transformational strategies for achieving cleaner, cheaper and smarter solutions to environmental problems.

Learning From Existing Projects

Throughout the experimentation process, EPA remains committed to the basic principles of Project XL. Some projects last for several years, so EPA will remain engaged with project sponsors to track the evolution of innovations and gauge the actual environmental performance against expected outcomes. Experiments must show superior environmental performance and meaningful involvement of interested parties and they must be transferable to other facilities, processes or technologies. Early Project XL results indicate that we can create better environmental outcomes when all affected parties work together toward a common goal.

Today, as an organization EPA faces new phases of the Project XL challenge: As the information on project results expands exponentially, what are the best methods for transforming results into knowledge? As we evaluate and learn how these new tools work, how do we match the right tools to the right problems? How do we increase our rate and scale of adopting new ideas into appropriate system-wide practice? How do we translate our innovation experience into improved processes that will enhance our ability to test new concepts?

In theory, the innovation process in an organization can be divided into two broad activities— incubation and implementation[22] . Incubation is defined as collecting information, conceptualizing, and planning for the innovation's testing, all leading up to the decision to adopt. During the incubation phase, the organization must recognize the need for innovations and have a matching willingness to experiment. For Project XL, incubation includes the steps leading up to the signing of the final project agreement (FPA). The decision to test a Project XL innovation separates the incubation phase from the implementation phase. Implementation consists of all the events, actions, and decisions leading to the adoption of an innovation. In the implementation phase, the organization must produce results to verify the innovation's potential, clarify results as the innovation is put into more widespread use, and routinize the innovation into its regular activities. The innovation process is complete when the innovation becomes a routine part of the organization's business process and environmental protection system.

EPA plans to explore the application of this theory of the innovation process, as well as related theories and processes in an effort to continue building our system of innovation for Project XL. This important phase of Project XL coincides with a Agency-wide effort to learn from this and other innovation efforts how to best infuse the regulatory climate with processes that will address constantly changing conditions—environmental, technical, socioeconomic, and political—through new, creative solutions.

A Laboratory of Innovation

As a vehicle for testing new ideas in environmental protection, Project XL is unprecedented. Predictably for an experimental program, it has not been without some conflict and controversy. But it also has yielded important discoveries and insights about ways to improve environmental results. Of the many lessons EPA has learned from this unique program, some of the most important are:

- It is possible to experiment with new approaches outside the traditional regulatory system as long as strong, reliable safeguards are in place.
- Some businesses and communities are not only willing, but eager, to take greater responsibility for environmental results if they are given flexibility in meeting the goals.
- If given an opportunity, citizens and other stakeholders can play an active, creative role in finding solutions to problems.
- The opportunities to improve become more visible, and the results potentially more significant, when you step back and look at communities or facilities as a whole, rather than as a set of separate, unrelated components.

Although we have substantial number of experiments underway, EPA's need to test new tools and new solutions will not end. Our stakeholders will continue to have innovative ideas for achieving cleaner, cheaper, and smarter environmental protection and EPA is committed to providing a vehicle for testing and implementing those concepts. This next phase will reflect the Agency-wide commitment to adopt and implement innovative ideas on a larger scale. EPA's goal is to provide even stronger incentives for good performance and going beyond compliance by developing new programs and approaches, such as the National Environmental Performance Track program launched on June 26, 2000. Lessons learned in Project XL will continue to be integral to developing these high performance alternatives.

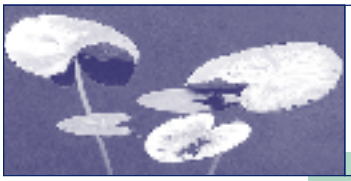
We believe that the type of experimentation allowed under Project XL is fundamental to continued advances in environmental protection. Indeed, we believe that sustaining our strong national legacy of environmental progress depends on innovation—at EPA, in state environmental programs, in local governments, in businesses, in communities—in all parts of our society. That is why EPA launched Project XL, and it is why we will continue support-

[22] Everett M. Rogers. *Diffusion of Innovations, 4th Edition,* New York: The Free Press, 1995.

ing and encouraging the search to diversify our environmental protection tools, identify new approaches, learn about the keys to their effective use, and match the right tools to the right problems.

The future will undoubtedly raise new challenging issues, but we are better prepared than ever to respond. With the results of the full array of projects at hand, along with the results from the Agency's other innovative efforts, the greatest challenge will be selecting among all the available options to design the most effective response to existing and emerging environmental problems. In some cases, existing laws and regulations will continue to be the best way to reduce risk. But better results at lower costs may be realized by applying tailored strategies that involve pollution prevention, maximizing the use of new technology, site specific reinvestment, new reporting alternatives, livability and smart growth strategies, and other incentives. Through Project XL and EPA's other innovative efforts we will meet the challenges of tomorrow by finding, testing and adopting cleaner, cheaper and smarter environmental management strategies today.

Information Sources and Methodology



This report relies on the cumulative information from a number of sources. The sections below describes these sources with brief descriptions of the methodologies involved in developing them.

Sponsor's Reports

Project sponsors prepare quarterly, midyear, or annual reports as required by the individual project final project agreements (FPAs). For more information on these reports, please visit EPA's Project XL Web site at *http://www.epa.gov/ProjectXL*.

EPA Progress Reports

Progress reports completed in March and December 1999 provide an overview of the status of projects implementing final project agreements for one year or more. These reports are developed by EPA with the assistance of the project sponsors and co-regulators; and the stakeholders who are direct participants in the projects have the opportunity to review them. The progress reports include (1) a background section briefly describing the facility's project and anticipated environmental benefits, (2) a description of the regulatory flexibility offered by EPA and other regulatory agencies, (3) a summary of innovations and potential system change, (4) the status of commitments made by the facility, (5) a review of the progress in environmental performance, (6) a summary of the stakeholder involvement for the project, (7) names and organizations of the project contacts, and (8) a six-month outlook section. These progress reports are available on the Internet via EPA's Project XL Web site at *http://www.epa.gov/ProjectXL*.

Project Focus Groups

EPA conducted focus groups in December 1998, January 1999, and January 2000 for various projects. Focus group participants included company employees, co-regulator representatives (typically state and local governments), citizen and non-government organization stakeholders, and EPA Headquarters and regional staff. Project-specific protocols were distributed to participants prior to each focus group conference call. During the focus groups, participants gave opinions on (1) the ease and effectiveness of the project implementation pro-

cess, (2) the value of the project to their organization, and (3) the opportunities to apply information gained from the projects more broadly. These are part of an annual program evaluation cycle for Project XL and serve as an opportunity for project participants to provide feedback to EPA on any aspect of their experience in developing and implementing a project. A list of the focus groups and their participants are in Volume 2: Directory of Project Experiments and Results.

Stakeholder Involvement Reports

In September 1998, a report entitled *Evaluation of Project XL Stakeholder Processes* (EPA-100-R-98-009) was prepared by Resolve, Inc. This report provided a review of the design and conduct of the stakeholder processes at four of the initial projects (Intel, Weyerhaeuser, HADCO, Merck). The report described the involvement of stakeholders in FPA negotiation and implementation, with information on national and local stakeholder perspectives about their role. It also outlined the various models developed by company sponsors and reported stakeholder perspectives on the processes as gathered in a stakeholder survey.

In 1999, EPA initiated a second extensive evaluation, which was conducted by the Southeast Negotiation Network. *Project XL Stakeholder Involvement Evaluation* (August 2000) covers eight projects in various stages of negotiation or implementation (Andersen, Atlantic Steel, Crompton, ExxonMobil, HADCO, Intel, New England Universities Laboratories, and Vandenberg AFB). It considers the early dynamics of stakeholder processes in projects developing their FPA, stakeholder satisfaction and effectiveness of involvement for projects that had recently signed their agreements, and the status of ongoing involvement in projects that have been underway for at least one year.

Other EPA Reports

The *Project XL Preliminary Status Report* (September 1998) examined three projects in implementation for at least a year as of January 1998: Berry, Intel, and Weyerhaeuser. The report covers the projects' initial results on innovation and system change, as well as progress in meeting FPA commitments, stakeholder participation outcomes, environmental performance, and lessons learned.

The *Project XL 1999 Comprehensive Report* (October 1999) provides an overview of the status of 14 projects, as well as program-wide results and lessons learned. It also presents technical and policy information on 25 innovations sorted by core functions. Information complied in progress reports, focus groups, stakeholder reports, and other documentation and information gained through the experience of Agency staff is synthesized and described. The report follows up the work started in the Preliminary Status Report.

Glossary

Adsorbable Organic Halogens (AOX): AOX is a measurement of the amount of organic halogens present in water. In paper manufacture organic halogens are commonly byproducts of chlorine bleaching processes. The AOX value is expressed in equivalent chlorine.

Aerobic: Life or processes that require, or are not destroyed by, the presence of oxygen. (See: anaerobic.)

Aluminum Chemical Vapor Deposition Process: A dry process used for the current generation semiconductor device technologies. Vapor deposition technologies include processes that put materials into a vapor state via condensation, chemical reaction, or conversion.

Anaerobic: A life or process that occurs in, or is not destroyed by, the absence of oxygen.

Area of Contamination (AOC): A non-discrete land area on which there is generally dispersed contamination. Generally, for contaminated soil, considered are sampling locations that indicate observed contamination and the area lying between such locations to be an area of observed contamination. Asphalt or other impenetrable materials contaminated by site-related hazardous substances may be considered areas of observed contamination.

Asbestos-Containing Waste Materials (ACWM): Mill tailings or any waste that contains commercial asbestos and is generated by a source covered by the Clean Air Act Asbestos NESHAPS.

Attainment Area: A designated geographic area considered to have air quality as good as or better than the national ambient air quality standards as defined in the Clean Air Act. An area may be an attainment area for one pollutant and a nonattainment area for others.

Baseline Standard: The measure by which future environmental performance can be compared.

Best Management Practice (BMP): Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources.

Biochemical Oxygen Demand (BOD): A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. The greater the BOD, the greater the degree of pollution.

Biodegradable: Capable of decomposing under natural conditions.

Black liquor: Spent cooking liquor that has been separated from the pulp produced by the kraft, soda, or semi-chemical pulping process.

Brownfield: Abandoned, idled, or underused industrial and commercial facilities/sites where expansion or redevelopment is complicated by real or perceived environmental contamination. They can be in urban, suburban, or rural areas.

Carbon Monoxide (CO): A colorless, odorless, poisonous gas produced by incomplete fossil fuel combustion.

Catalytic Oxidation: Catalytic oxidation is an alternative technology used in selective applications to greatly reduce emissions due to VOCs, hydrocarbons, odors, and opacity in process exhaust. VOCs are thermally destroyed at high temperatures by using a solid catalyst. Catalyst systems used to oxidize VOCs typically use metal oxides.

Categorical Industrial User: An industrial user which is subject to a categorical standard promulgated by EPA.

Categorical Pretreatment Standard: A technology-based effluent limitation for an industrial facility discharging into a municipal sewer system.

Chemical Oxygen Demand (COD): A measure of the oxygen required to oxidize all compounds, both organic and inorganic, in water.

Chloroform: A colorless liquid with a sweet odor. It is used primarily in the production of chlorofluorocarbon and in the production of plastics. Its other uses are as an industrial solvent in the extraction and purification of some antibiotics, alkaloids, vitamins, and flavors; as a solvent for lacquers, floor polishes, resins, fats, adhesives, oils, and rubber.

Clean Air Act (CAA): The Clean Air Act is the comprehensive Federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

Clean Water Act (CWA): The Clean Water Act sets the basic structure for regulating discharges of pollutants to waters of the United States. The law gives EPA the authority to set technology-based effluent standards on an industry basis and continues the requirements to set water quality standards for all contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a National Pollutant Discharge Elimination System (NPDES) permit is obtained under the Act.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): CERCLA is the legislative authority for the Superfund program funds and carries out EPA solid waste emergency and long-term removal and remedial activities. These activities include establishing the National Priorities List (NPL), investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions.

Conditional Delisting: Use of the petition process to have a facility's toxic designation rescinded.

Conformity: Conformity is a Clean Air Act requirement intended to ensure that new transportation investments do not jeopardize air quality in nonattainment and maintenance areas. According to the Clean Air Act, no transportation activity can be funded or supported by the Federal government unless it conforms to the purpose of a state's air quality plan. An EPA rule describing the criteria and procedures for determining conformity is found in 40 CFR parts 51 and 93.

Consent Decree: A legal document, approved by a judge, that formalizes an agreement reached between EPA and potentially responsible parties (PRPs) through which PRPs will conduct all or part of a cleanup action at a Superfund site; cease or correct actions or processes that are polluting the environment; or otherwise comply with EPA initiated regulatory enforcement actions to resolve the contamination at the Superfund site involved. The consent decree describes the actions PRPs will take and may be subject to a public comment period.

Consumptive Water Use: Water removed from available supplies without return to a water resources system, e.g., water used in manufacturing, agriculture, and food preparation.

Continuous Emission Monitoring (CEM): Continuous measurement of pollutants emitted into the atmosphere in exhaust gases from combustion or industrial processes.

Criteria Air Pollutants: The CAA requires EPA to set National Ambient Air Quality Standards (NAAQS) for certain pollutants known to be hazardous to human health. EPA has identified and set standards to protect human health and welfare for six criteria air pollutants—ozone, carbon monoxide, total suspended particulates, sulfur dioxide, lead, and nitrogen oxides. EPA must describe the characteristics and potential health and welfare effects of these pollutants.

Data Call-In: A part of the Office of Pesticide Programs (OPP) process of developing key required test data, especially on the long-term, chronic effects of existing pesticides.

Dioxin: Any one of a family of compounds known chemically as dibenzo-p-dioxins. Concern about dioxin arises from their potential toxicity as a contaminant in commercial products. Tests on laboratory animals indicate that dioxin is one of the most toxic of synthetic compounds.

Discharge Monitoring Reporting (DMR): Facilities that discharge wastewater directly from point sources to surface waters must submit DMRs under National Pollution Discharge Elimination System (NPDES) wastewater permitting.

Dredge: Dredging: Removal of mud from the bottom of water bodies. This can disturb the ecosystem and causes silting that kills aquatic life. Dredging of contaminated muds can expose biota to heavy metals and other toxics. Dredging activities may be subject to regulation under Section 404 of the Clean Water Act.

Ecological Risk Assessment: The application of a formal framework, analytical process, or model to estimate the effects of human action(s) on a natural resource and to interpret the significance of those effects in light of the uncertainties identified in each component of the assessment process. Such analysis includes initial hazard identification, exposure and dose response assessments, and risk characterization.

Effluent: Wastewater or other liquid, raw (untreated), partially or completely treated, flowing from an industrial user, treatment process or treatment plant.

Electroplating Operations: Involves plating various metals onto printed wiring boards and computer components that provide electronic interconnection.

Emergency Planning and Community Right to Know (EPCRA): Also known as Title III of SARA, EPCRA was enacted by Congress as the national legislation on community safety. This law was designated to help local communities protect public health, safety, and the environment from chemical hazards.

Emissions Cap: A limit designed to prevent projected growth in emissions from both existing and future stationary sources from exceeding any mandated levels. Generally, such provisions require that any emission increase from equipment at a facility be offset by emission reductions from other equipment under the same cap.

End-of-Pipe Controls: Technologies, such as scrubbers on smokestacks and catalytic convertors on automobile tailpipes, that reduce the emission or discharge of pollutants to the environment after they have formed.

Engineering Evaluation/Cost Analysis (EE/CA): The EE/CA is a flexible document tailored to identify and analyze the scope, goals, objectives, and effectiveness of a non-time-critical removal action. It contains only those data necessary to identify the selection of a response alternative and relies on existing documentation whenever possible.

Environmental Council of States (ECOS): The mission of ECOS is to improve the environment of the United States by providing for the exchange of ideas, views and experiences among states and territories, fostering cooperation and coordination in environmental management, and articulating state positions on environmental issues.

F006 Listing: A hazardous waste that is wastewater treatment sludge produced from nonspecific electroplating processes and operations.

Feasibility Study (FS): Analysis of the practicability of a proposal; e.g., a description and analysis of potential cleanup alternatives for a site such as one on the National Priorities List. The feasibility study usually recommends selection of a cost-effective alternative. It usually starts as soon as the remedial investigation is underway; together, they are commonly referred to as the "RI/FS."

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA): The primary focus of FIFRA was to provide federal control of pesticide distribution, sale, and use. EPA was given authority under FIFRA not only to study the consequences of pesticide usage but also to require users (farmers, utility companies, and others) to register when purchasing pesticides. Through later amendments to the law, users also must take exams for certification as applicators of pesticides. All pesticides used in the United States must be registered (licensed) by EPA.

Fenceline Standard: A baseline standard measured at the property line of a facility.

Flexible Fuel Vehicle (FFV): A vehicle specially designed to use methanol or regular unleaded gasoline in any combination from a single tank. The vehicles have a special sensor on the fuel line that detect the ratio of methanol to gasoline that is in the tank. The vehicle's fuel injection and ignition timing are adjusted by an onboard computer to compensate for the different fuel mixtures.

Fly Ash: Non-combustible residual particles expelled by flue gas.

Fugitive Emissions: Emissions not caught by a capture system.

Gasification: Conversion of solid material such as coal into a gas for use as a fuel.

Global Positioning System (GPS): A precise surveying system based on a set of satellites that orbit about 12,000 miles above the earth. On earth, a hand-held specialized computer, a portable GPS receiver, can receive signal from a GPS satellite above the horizon. The receiver then calculates absolute position, an accuracy that is usually within a few feet, or better.

Greenfield: Greenfields are generally parkland, previously undeveloped open space and agricultural lands, located near the outskirts of towns, cities and larger metropolitan areas. (See: Brownfield)

Hazardous Air Pollutants (HAPs): Air pollutants that are not covered by the National Ambient Air Quality Standards but that may have an adverse effect on human health or the environment. Such pollutants include asbestos, beryllium, mercury, benzene, coke-oven emissions, radionuclides, and vinyl chloride.

Hazardous Waste: Byproducts of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Hazardous waste possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

Hydrogen Chloride: Hydrogen chloride is a non-combustible compound that is highly soluble in water. In aqueous solution, it forms hydrochloric acid. Hydrochloric acid is used to make and clean metals, to make chloride dioxide for the bleaching of pulp and other chemicals, to make phosphate fertilizers and hydrogen, for the neutralization of basic systems, in the treatment of oil and gas wells, in analytical chemistry, and in the removal of scale from boilers and heat-exchange equipment.

Hydrogen Flouride: Hydrogen fluoride, or hydrofluoric acid, is a colorless gas or fuming liquid. It is a chemical intermediary for fluorocarbons, aluminum fluoride, cryolite, uranium hexafluoride, and fluoride salts. It is used in fluorination processes, as a catalyst, and as a fluorinating agent in organic and inorganic reactions. It is used to clean cast iron, copper, and brass; remove efflorescence from brick and stone; or sand particles from metallic castings.

Indirect Discharge: Introduction of pollutants from a non-domestic source into a publicly owned waste-treatment system. Indirect dischargers can be commercial or industrial facilities whose wastes enter local sewers.

Influent: Wastewater or other liquid, raw (untreated), partially or completely treated, flowing into a treatment process or treatment plant.

Industrial User: Any non-domestic source which introduces pollutants into a municipal wastewater collection system [40CFR 403.3(h)]

Interference: A discharge which, alone or in conjunction with a discharge from other sources, both (1) inhibits or disrupts the POTW and (2) therefore is a cause for violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

International Organization for Standardization (ISO) 14000: ISO 14000 is primarily concerned with environmental management. The ISO 14000 series sets out the methods that can be implemented in an organization to minimize harmful effects on the environment caused by pollution or natural resource depletion.

Kraft Mill: Any industrial operation that uses for a cooking liquor an alkaline sulfide solution containing sodium hydroxide and sodium sulfide in its pulping process.

Land Disposal Restrictions (LDR): Rules that require hazardous wastes to be treated before disposal on land to destroy or immobilize hazardous constituents that might migrate into soil and ground water.

Lignin: Organic substance that acts as a binder for the cellulose fibers in wood and certain plants and adds strength and stiffness to the cell walls. It imparts considerable strength to the wall and also protects it against degradation by microorganisms.

Low-emitting Vehicle (LEV): A vehicle that emits 0.075 g of hydrocarbons per mile.

Maximum Available Control Technology (MACT): The emission standard for air pollution sources requiring the maximum reduction of hazardous emissions, taking cost and feasibility into account. Under the CAA Amendments of 1990, the MACT must not be less than the average emission level achieved by controls on the best performing 12 percent of existing sources, by category, of industrial and utility sources.

Maximum Containment Level (MCL): The maximum permissible level of a contaminant in water delivered to any user of a public system. MCLs are enforceable standards.

Methanol: An alcohol that can be used as an alternative fuel or as a gasoline additive. Poisonous if ingested.

Methyl Chloride: A colorless flammable gas. Used in the production of chemicals, as a solvent and refrigerant, and as a food additive. Mildly toxic if inhaled.

Metallization: The fabrication step in which proper interconnection of circuit elements is made. The act or process of imparting metallic properties to something.

Mobile Source: Any non-stationary source of air pollution such as cars, trucks, motorcycles, buses, airplanes, and locomotives.

"The MON": The National Emission Standard for Hazardous Air Pollutants (NESHAP) for the source category "Miscellaneous Organic Chemical Production and Processes." Some examples of these processes are: explosives production; photographic chemicals production; polyester resins production; and the production of paints, coatings and adhesives.

Multimedia: Several environmental media, such as air, water, and land.

National Ambient Air Quality Standards (NAAQS): Standards established by EPA under the Clean Air Act applicable to outdoor air throughout the country.

National Contingency Plan (NCP): The Federal regulation that guides determination of the sites to be corrected under both the Superfund program and the program to prevent or control spills into surface waters or elsewhere.

National Emissions Standards for Hazardous Air Pollutants (NESHAPs): Emissions standards set by EPA for air pollutants not covered by National Ambient Air Quality Standards (NAAQS), that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness. Primary standards are designed to protect human health, and secondary standards are designed to protect public welfare (e.g., building facades, visibility, crops, and domestic animals).

National Pollutant Discharge Elimination System (NPDES): A provision of the CWA that prohibits the discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or where delegated, a tribal government on an Indian reservation.

National Priorities List (NPL): EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. The list is based primarily on the score a site receives from the Hazard Ranking System. EPA is required to update the NPL at least once a year. A site must be on the NPL to receive money from the Trust Fund for remedial action.

New Source Performance Standards (NSPS): Uniform national EPA air emission and water effluent standards which limit the amount of pollution allowed from new sources or from modified existing sources.

New Source Review (NSR): The NSR provisions of the Clean Air Act strive to ensure that potential new sources of air pollution (new plants or facilities, or additions to existing ones) take proper steps to minimize pollution levels. The goals of the NSR program are (1) to ensure that an increase in emissions due to a new source or modification to an existing source does not significantly deteriorate air quality; (2) to ensure that source emissions are consistent with applicable State attainment plans; (3) to ensure that air quality related values are not negatively impacted in areas that have greater pollution problems; and (4) to establish control technology requirements that maximize productive capacity while minimizing impacts on air quality.

Nitrogen Oxides (NO_x): Air pollutants that are the result of photochemical reactions of nitric oxide in ambient air. Typically, it is a product of combustion from transportation and stationary sources. It is a major contributor to the formation of tropospheric ozone, photochemical smog, and acid deposition.

Nonattainment Area: A designated geographic area that does not meet one or more of the National Ambient Air Quality Standards for the criteria pollutants designated in the Clean Air Act. (See: Attainment)

Non-time-critical Removal (NTC): Those removals where, based on the site evaluation, the lead agency determines that a removal action is appropriate and that there is a planning period of more than six months available before on-site activities begin.

Organic Compounds: Naturally occurring (animal or plant-produced) or synthetic substances containing mainly carbon, hydrogen, nitrogen, and oxygen.

Oxygen Delignification: Use of oxygen to remove lignin from pulp after high-density stock storage and prior to the bleaching system. Oxygen delignification system equipment includes the blow tank, washers, filtrate tanks, any interstage pulp storage tanks, and any other equipment serving the same function as those previously listed.

Particulate Matter (PM): Fine liquid or solid particles, such as dust, smoke, mist, fumes, or smog, found in air or emissions.

Phosphine: Phosphine occurs as a colorless, flammable gas that is slightly soluble in water. It is used as an intermediate in the synthesis of flame retardants for cotton fabrics, as a doping agent for n-type semiconductors, a polymerization initiator, and a condensation catalyst.

Plant Site Emission Limits (PSELs): Plant site emission limits are facility based emission caps that allow production changes and facility expansion without recurring air quality permit reviews.

Point Source: A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g., a pipe, ditch, ship, ore pit, factory smokestack.

Pollution Prevention: 1. Identifying areas, processes, and activities which create excessive waste products or pollutants in order to reduce or prevent them through alteration, or eliminating a process. Such activities, consistent with the Pollution Prevention Act of 1990, are conducted across all EPA programs and can involve cooperative efforts with such agencies as the Departments of Agriculture and Energy. 2. EPA has initiated a number of voluntary programs in which industrial, or commercial or "partners" join with EPA in promoting activities that conserve energy, conserve and protect water supply, reduce emissions or find ways of utilizing them as energy resources, and reduce the waste stream.

Pass-through: A discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with other discharge sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Perfluorinated Compounds (PFCs): Compounds in which all the hydrogen atoms are replaced by fluorine. PFCs are greenhouse gases and are expected to have long atmospheric lifetimes.

Point Source: A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g., a pipe, ditch, ship, ore pit, factory smokestack.

Potentially Responsible Party (PRP): A PRP is the owner or operator of a contaminated site, or the person or persons whose actions or negligence may have caused the release of pollutants and contaminants into the environment, requiring a remedial action response under CERCLA and SARA. The PRP is potentially liable for the cleanup costs in order to compensate the government for its remediation expenditures.

Pretreatment: Processes used to reduce, eliminate, or alter the nature of wastewater pollutants from non-domestic sources before they are discharged into publicly owned treatment works (POTW).

Premanufacture Notification (PMN): Section 5 of TSCA regulates anyone who plans to manufacture or import a "new" chemical substance for commercial purposes. Under section 5, EPA requires notice before manufacture or importation of non-exempt substances so that EPA can evaluate whether the chemical substance poses a threat to human health or the environment. This notice is called a premanufacture notice (PMN).

Prevention of Significant Deterioration (PSD): Standards aimed at keeping areas that are in compliance with National Ambient Air Quality Standards from backsliding.

Printed Wiring Board (PWB): A device that provides electronic interconnections and a surface for mounting electronic components.

Production Unit Factor (PUF): A production-based performance measure.

Pyrolyzed: (Pyrolysis): Decomposition of a chemical by extreme heat.

Radiolabel: To tag (a hormone, an enzyme, or other substance) with a radioactive tracer.

Relative Accuracy Test Audits (RATA): The primary method of determining the correlation of continuous emissions monitoring system data to simultaneously collected reference method test data, using no fewer than nine reference method test runs conducted as outlined in 40 CFR 60, Appendix A.

Regulated Asbestos-Containing Material (RACM): Under the asbestos NESHAP, RACM is defined as: (1) friable asbestos material, (2) Category I non-friable Asbestos Containing Material (ACM) that has become friable, (3) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting or abrading, or (4) Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

Remedial Investigation (RI): An in-depth study designed to gather data needed to determine the nature and extent of contamination at a Superfund site; establish site cleanup criteria; identify preliminary alternatives for remedial action; and support technical and cost analyses of alternatives. The remedial investigation is usually done with the feasibility study. Together they are usually referred to as the "RI/FS."

Remining: The surface mining of previously-mined and abandoned surface and underground mines to obtain remaining coal reserves.

Remote Monitoring Station: Self-contained multidetector electronic instruments installed at remote locations in creeks and other water bodies to assess ambient water quality and detect real-time changes of dissolved oxygen, pH, conductance and temperature.

Removal Action: A removal action is a short-term Federal response to prevent, minimize, or mitigate damage to the public or the environment at sites where hazardous substances have been released. Examples of removal actions are excavating contaminated soil, erecting a security fence, or stabilizing a berm, dike, or impoundment. Removal actions may also be necessary in the event of the threat of release of hazardous substances into the environment such as taking abandoned drums to a proper disposal facility. Removal actions may take place at NPL or non-NPL sites.

Remedial Action: Remedial actions are actions documented in the ROD that are taken at NPL sites to eliminate or reduce the pollution to levels which prevent or minimize the release of hazardous substances so that they do not migrate or cause substantial danger to public health or welfare, or the environment. An example is to remove hazardous constituents from groundwater using pump and treat technologies.

Resource Conservation and Recovery Act (RCRA): Passed in 1976, RCRA gives EPA the authority to control hazardous waste from "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of nonhazardous wastes. RCRA enables EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future facilities and does not address abandoned sites.

Response Action: Generic term for actions taken in response to actual or potential health-threatening environmental events such as spills, sudden releases, and asbestos abatement/management problems. A CERCLA-authorized action involving either a short-term removal action or a long-term remedial response.

Record of Decision (ROD): A ROD documents the remedy decision for a site or operable unit. The ROD certifies that the remedy selection process has followed the requirements of CERCLA and the NCP, and discusses the technical components of the remedy. The ROD also provides the public with a consolidated source of information about the site.

Reverse Osmosis (RO): Reverse Osmosis is a high-pressure filtration process which separates dissolved salt and minerals from water, using a membrane. Clean water passes through the membrane, and the salt and minerals are rejected.

Riparian Zone: Areas adjacent to rivers and streams with a differing density, diversity, and productivity of plant and animal species relative to nearby uplands.

Safe Drinking Water Act (SDWA): SDWA was established to protect the quality of drinking water. This law focuses on all waters actually or potentially designated for drinking use, whether from above-ground or underground sources. The Act authorizes EPA to establish safe standards of purity and requires all owners or operators of public water systems to comply with primary (health-related) standards. State governments, which assume this power from EPA, also encourage attainment of secondary standards (for example, water clarity).

Semi-chemical Mill: A mill that produces pulp using a combination of both chemical and mechanical pulping processes, with or without bleaching.

Sludge: A semi-solid residue from any of a number of air or water treatment processes; this can be a hazardous or non-hazardous waste.

Sludge Dryers: A piece of equipment that reduces the volume and weight of the semi-solid sludge wastes by drying and reducing the water content of the sludge.

Smelter: A facility that melts or fuses ore, often with an accompanying chemical change, to separate its metal content. Emissions cause pollution. "Smelting" is the process involved.

State Implementation Plan (SIP): EPA approved state plans for the establishment, regulation, and enforcement of air pollution standards.

Stationary Source: A fixed-site producer of pollution, mainly power plants and other facilities using industrial combustion processes. (See: Point Source.)

Sulfur Dioxide (SO_2): SO_2 gases are formed when fuel containing sulfur (mainly coal and oil) is burned and can be formed during metal smelting and other industrial processes. Sulfur dioxide is associated with acidification of lakes and streams, accelerated corrosion of buildings and monuments, reduced visibility, and such adverse health effects as inhibition of breathing, respiratory illness, and aggravation of existing cardiovascular disease.

Sulfuric Acid: Sulfuric acid is a clear, colorless, oily, and odorless liquid. It is also known as sulphine acid

and hydrogen sulfate. Its main use is in phosphate fertilizer production. It is also used to manufacture other acids, explosives, dyestuffs, parchment paper, glue, wood preservatives, and lead-acid batteries in vehicles. It is used in the purification of petroleum, the pickling of metal, electroplating baths, nonferrous metallurgy, and production of rayon and film; and as a laboratory reagent.

Superfund: The program operated under the legislative authority of CERCLA and SARA that funds and carries out EPA hazardous waste emergency and long-term removal and remedial activities. These activities include establishing the National Priorities List, investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions.

Sustainable Forestry Initiative (SFI): The Sustainable Forestry Initiative™ is a comprehensive program of forestry and conservation practices designed to ensure the continuing sustainable management of forestlands. The SFI was developed nationally through the American Forest and Paper Association (AF&PA), whose members produce 90 percent of the paper and 60 percent of the lumber produced in America today. Compliance with the SFI guidelines is mandatory for AF&PA companies to retain AF&PA membership.

300-millimeter Wafer: Early this year, Intel announced it will build its first 300-millimeter, high-volume production manufacturing facility at its Chandler site. The 300-millimeter wafers represent a technological advance in semiconductor chips over the standard 200-millimeter (8-inch) wafers that are used in many semiconductor manufacturing plants today. 300-millimeter chips offer over twice as much surface area over the conventional chips and will reduce manufacturing costs per wafer by more than 30 percent.

Title V of the Clean Air Act: Establishes a Federal operating permit program that applies to any major stationary facility or source of air pollution. The purpose of the operating permits program is to ensure compliance with all applicable requirements of the CAA. Under the program, permits are issued by states or, when a state fails to carry out the CAA satisfactorily, by EPA. The permit includes information on which pollutants are being released, how much may be released, and what kinds of steps the source's owner or operator is taking to reduce pollution, including plans to monitor the pollution.

Toxic Release Inventory (TRI): Database of toxic releases in the United States compiled from SARA Title III Section 313 reports.

Toxic Substances Control Act (TSCA): TSCA was enacted by Congress in 1976 to give EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the United States. EPA repeatedly screens these chemicals and can require reporting or testing of those that may pose an environmental or human-health hazard. EPA can ban the manufacture and import of those chemicals that pose an unreasonable risk.

Total Kjeldahl Nitrogen (TKN): TKN is defined functionally as organically bound nitrogen. TKN is the sum of free ammonia and organic nitrogen compounds which are converted to ammonium sulfate. Organic nitrogen includes such materials as proteins, peptides, nucleic acids, urea and numerous synthetic organic compounds.

Total Suspended Solids (TSS): A measure of the suspended solids in wastewater, effluent, or water bodies, determined by tests for "total suspended nonfilterable solids."

Transitional Low-Emitting Vehicles: A vehicle that emits 0.125 g of hydrocarbons per mile.

Transportation Control Measure(TCM): TCMs include a variety of measures used to reduce motor vehicle emissions, primarily reducing the amount of vehicle miles traveled (VMTs). These can include carpool and vanpool programs, parking management, traffic flow improvements, high occupancy vehicle lanes, and park-and-ride lots.

Tributyltin (TBT): TBT based paints assist in keeping ship hulls free of marine organisms by acting as both a biocide and as an agent that imparts a "self-polishing" quality to marine paints. For ocean going vessels, TBT self-polishing copolymer paints are currently the most effective means of preventing ship hull fouling by marine organisms.

Variance: Government permission for a delay or exception in the application of a given law, ordinance, or regulation.

Vehicle Miles Traveled (VMT): A measure of the total amount of miles traveled by vehicle within a region.

Volatile Organic Compounds (VOCs): Any organic compound that easily evaporates and participates in

atmospheric photochemical reactions, except those designated by EPA as having negligible photochemical reactivity.

Wastewater: Spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter.

Wastewater Treatment Sludge: The sludge that is produced from the treatment and removal of pollutants of wastewater.

Watershed: The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point.

"Wet" Demolition Method: A demolition technique specified in the Asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAP) requirements to limit the release the asbestos particulates.