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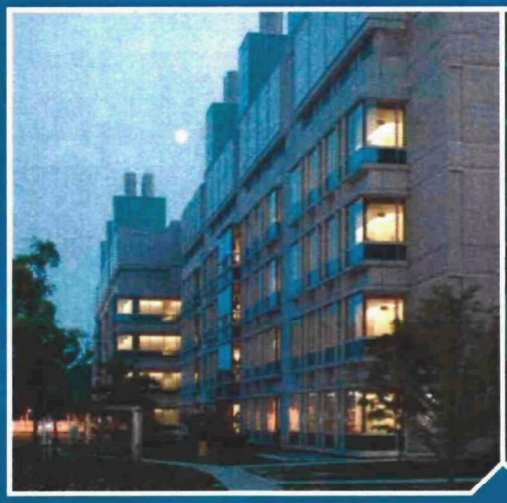
Commonsense Actions and Best Practices that Improve Laboratory Efficiency and Effectiveness



U.S. Environmental Protection Agency

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Commonsense Actions and Best Practices that Improve Laboratory Efficiency and Effectiveness

U.S. Environmental Protection Agency
Washington, DC 20460

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Acknowledgments

This document was prepared by members of U.S. Environmental Protection Agency identified on page vii.

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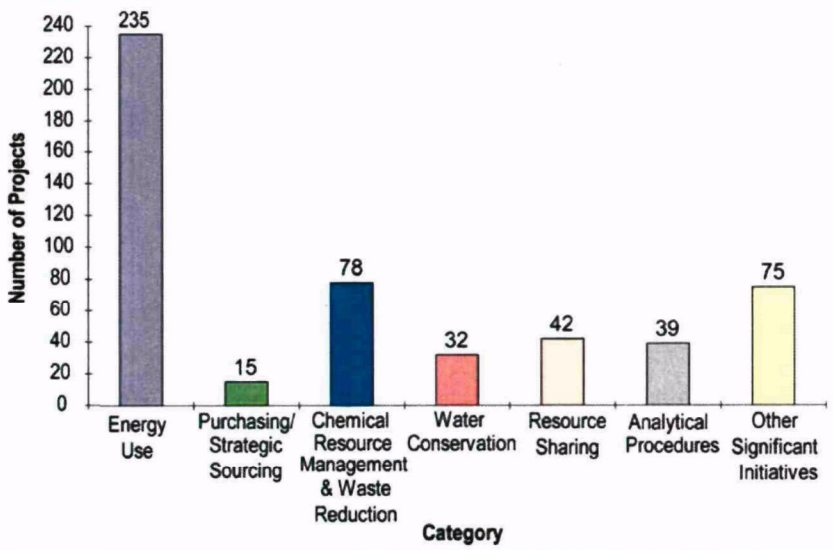
1.0
Executive Summary

1.1 Introduction to Near-Term Study

Guided by principles in the President's Management Agenda (PMA) to be results-oriented, the United States Environmental Protection Agency (EPA, "the Agency") is working actively to measure its progress in relation to solving environmental problems and improving environmental and human health. Sound science and technical support from EPA laboratories help create the foundation for Agency decisions and environmental achievements.

Exhibit 1. Organization and Distribution of 516 Commonsense Actions and Best Practices



EPA Administrator Stephen Johnson has requested a review of the Agency's laboratory capabilities and operations. The goal of this effort is to improve the effectiveness and efficiency of EPA's laboratory network, ensuring its ability to support the Agency's mission into the future. The laboratory review will include both near- and long-term objectives. In the near term, review efforts focus on identifying efficiency and effectiveness opportunities at individual labs. Over the long term, the Agency plans to engage an outside expert group that will assess and evaluate EPA's laboratory network needs over the next 10 years, and determine if the existing network is able to meet those needs.

This report describes near-term opportunities to improve efficiency and effectiveness at EPA laboratories. More than half the opportunities described in this report include actual experience and results at individual laboratories during the past several years. In the context of this experience, the report describes commonsense actions and best practices and serves as a guide for future actions across EPA's laboratory network. Many of these actions and best practices have multiple benefits. For example, they often avoid increased costs while being environmentally responsible.

This report assembles in one place the considerable experience of employees at EPA's laboratories in developing and implementing efficient and effective practices.

1.2 Collecting Best Practices

This report assembles in one place the considerable experience of employees at EPA's laboratories in developing and implementing efficient and effective practices. This review organizes and describes 516 actions, best practices, and suggestions identified by these employees—including opportunities to reduce energy and water use, to purchase supplies collectively in bulk, to reduce the amount of chemicals used and disposed of by the laboratories, and to increase resource sharing across multiple EPA laboratories.

Exhibit 1 illustrates the seven categories used to organize these actions and best practices—as well as the distribution of individual projects and suggestions across the seven categories. The majority of these projects and suggestions affect the operation and maintenance of EPA laboratory facilities.

This report is a short-term snapshot that reflects current experience at EPA laboratories. It is not intended to be systematic or quantitative. The report includes estimates provided by individual laboratories, where available, of avoided costs, savings, or environmental benefits. In most cases these estimates have not been verified in a systematic fashion or by engineering analyses. Although we do not have estimates of costs avoided for all of the actions and best practices provided in the report, there are instances where specific detail has been included. Such examples are appropriate because they help to provide useful information regarding return on investment.

1.3 Significant Efficiencies Achieved at Laboratories

The best practices identified in this report reflect a strong commitment by EPA laboratories and employees to responsibly manage government resources. Exhibit 2 highlights the most significant opportunities, actions, and best practices from the suggestions identified by EPA laboratories. A detailed review of these highlights is presented in Chapter 4.0 of this report.

Exhibit 2. Key Opportunities, Actions, and Best Practices

Energy Use (4.1):
• Recommission laboratory heating, ventilation, and air conditioning (HVAC) systems, and convert continuous air volume (CV) systems to variable air volume (VAV) systems. • Implement operations and maintenance best practices (e.g., upgrade to T-8 lights, implement temperature setbacks, turn off lights and equipment when not in use, develop and implement employee awareness programs). • Pursue energy savings performance contracts, where appropriate and advantageous for Agency.
Efficient Purchasing/Strategic Sourcing of Equipment and Supplies (4.2):
• Implement strategic sourcing initiative already started for laboratory commodities. • Measure the success/utility of this effort. • Explore opportunities for extending strategic sourcing to other laboratory purchase areas, such as gases and large equipment.
Chemical Resource Management and Waste Reduction (4.3):
• Continued development of microanalyses coupled with "green" chemistry is still an area of development and application that represents ongoing opportunities. • Reductions in chemical purchasing and waste disposal can be achieved through sharing of chemical stocks. This could be accomplished either through consolidation of chemical inventory systems, where feasible, or through other, improved means of cross-communication. • Continued implementation of recycling as part of best practices is recommended. This will also improve as additional markets for recyclables open.
Water Conservation (4.4):
• Develop and implement water management plans at all laboratories. As of March 2007, water management plans had been developed at 18 laboratory facilities; water consumption data for Fiscal Year (FY) 2006 revealed that the majority of those facilities recognized water use reductions. • Consider installation of water metering within facilities. This action will provide facilities with the ability to better monitor water use, especially in areas of high water use, and provide more accurate data on results of operational changes and/or the need for additional or different management practices. • Assess the efficiencies of major water use systems within the facilities (e.g., HVAC systems and water treatment systems). The intent of these assessments should be to determine ways to enhance operational efficiency of the systems that result in reduction of water use.
Improvements in Resource Sharing (4.5):
• Purchasing efficiencies, such as agreements with other organizations for analytical services; the use of EPA contracts expertise to ensure that equipment purchases are fully integrated; the establishment of interagency agreements (IAGs) with other federal organizations to utilize excess space; and the pursuit of cross-laboratory and division partnerships for capital equipment acquisitions. • Cooperative lab services, such as cross-divisional laboratories teaming up to accomplish work when a single lab is unable to fulfill a request for services. • Equipment sharing initiatives, where several laboratories implement principles of centralized and shared resources to improve efficiency. This optimizes the use of laboratory equipment and space with reduced investment costs. The concept of equipment sharing also means leveraging research funds by sharing expenses.
Efficient Analytical Procedures (4.6):
• Use automated sample preparation that reduces time, chemicals, and waste. • Explore innovative analytical instrumentation to maximize the number of analyses performed, leveraging current resources to accommodate growing demands. • Remove regulatory or other barriers to use more efficient and effective methods to generate data (e.g., employ performance-based measurements).
Other Significant Initiatives (4.7):
• When multiple facilities share a common location, integrate functions to improve efficiency. • Provide greater flexibility in work schedules for lab and field sampling staff to improve the effectiveness and efficiency of support for scientific programs. • Reduction of instrument service agreements through life-cycle planning and oversight of repair requirements. • Use of indefinite quantity contracts (IDIQs) to provide flexibility in use of contract services.

The benefits of these individual opportunities, actions, and best practices span a wide range—from avoided costs of hundreds of thousands to a few hundred dollars. The most significant avoided costs have occurred in the area of energy efficiency, where a number of laboratories have implemented measures that save hundreds of thousands of dollars each year. Moreover, the laboratories are hopeful that when the strategic sourcing project on laboratory supplies is implemented fully, it will result in additional, significant annual cost reductions. While some chemical management and waste disposal practices may result in only small efficiencies at one laboratory, implementation at multiple laboratories may extend the impact.

Collectively, the efforts described in this report help EPA achieve the long-term national efficiency goals established by Congress and the Office of the President (e.g., in the Energy Policy Act of 2005, the Energy Independence and Security Act of 2007, and in Executive Order 13423). By themselves, the opportunities described in this report do not permit EPA to achieve these national goals. Thus, EPA is taking many additional actions. For example, beyond the opportunities described here, EPA looks ahead to new and renovated buildings that demonstrate sustainable design and operation. Illustrating the Agency's commitment to sustainable and efficient buildings, EPA[1] and representatives from 16 other federal agencies signed a Memorandum of Understanding (MOU) entitled "Federal Leadership in High Performance and Sustainable Buildings" on January 24, 2006, at the White House Summit on Federal Sustainable Buildings. This MOU commits these federal agencies to the energy-efficient and sustainable design, construction, and operation of their facilities.

1.4 Summary and Next Steps

A primary objective of the near-term laboratory review is to identify opportunities for efficiency and effectiveness improvements at individual laboratories. The short-term snapshot of opportunities presented in this report demonstrates that this objective has been accomplished. More than half the opportunities described in the report extend beyond opportunities and include actual results—that is, tangible actions taken during the past several years at individual laboratories. These results demonstrate leadership and stewardship by EPA employees at individual laboratories to manage government resources effectively.

This report helps EPA transfer knowledge about the short-term opportunities and results in a systematic manner across EPA's laboratory network. EPA plans to distribute this report widely across its laboratory network and to urge laboratory and facility managers to adopt these commonsense actions and best practices wherever appropriate. Effective communication will help laboratory and facility managers make informed decisions about the highest-value actions and best practices—particularly when investments lead to significantly reduced operating costs and other benefits. When this is the case, applying these actions and best practices will lead to measurable long-term improvements in laboratory effectiveness and efficiency.

[1] Luis A. Luna, EPA Assistant Administrator for the Office of Administration and Resources Management, signed this MOU on behalf of EPA. Energy Management and Conservation Program: Fiscal Year 2006 Annual Report. U.S. Environmental Protection Agency, December 18, 2006, page 18.

2.0 Introduction

This chapter highlights the significant roles of EPA laboratories in fulfilling the Agency's mission. The chapter also describes the purpose and scope of the near-term laboratory study and the organization of this report.

2.1 How EPA Laboratories Fulfill the Agency's Mission

2.1.1 Roles of EPA Laboratories

EPA's laboratories bring science to environmental protection. They contribute the critical scientific and programmatic support vital to accomplishing the Agency's mission of protecting human health and the environment. The core characteristics of EPA laboratories, their diversity, adaptability to changing environments, and their quick responsiveness to crises, drive the success of the Agency as a whole.

EPA's laboratories are not carbon copies of one another; rather, the laboratories carry out a diverse set of responsibilities. In all, EPA has 39 laboratories in 27 cities (see Appendix 4.0). The 21 laboratories of EPA's Office of Research and Development (ORD) focus primarily on environmental research and development. The eight laboratories in four national programs - the Office of Air and Radiation (OAR), the Office of Enforcement and Compliance Assurance (OECA), and the Office of Prevention, Pesticides, and Toxic Substances (OPPTS), and the Office of Solid Waste & Emergency Response (OSWER) –serve a variety of functions, which include implementation of regulatory programs, specific support for voluntary programs, and direct scientific support. Additionally, 10 Regional laboratories provide a wide range of regulatory services and field and analytical services to the air, water, pesticide, toxics, hazardous waste and enforcement programs of the regions, states and tribes.

This study's effort to identify and share opportunities to improve the efficiency and effectiveness of EPA's laboratories will help to ensure that the laboratories continue to perform their crucial roles in the protection of the environment and human health. Appendix 5.0 contains the questions that were developed to help identify opportunities at individual laboratory locations. Appendix 6.0 presents the responses to these questions prepared by EPA laboratories.

As we face the new challenges of the 21st century, the roles of these EPA laboratories are necessarily changing and expanding. In this period of tight fiscal constraints, the ability of EPA's laboratories to continue their important work while taking on new, critical functions—such as those related to Homeland Security—necessitates that the laboratories find and pursue opportunities to do their work more efficiently.

2.1.2 EPA's Mission

Since its establishment in 1970, EPA has worked diligently in meeting its mission requirements for protecting human health and the environment. Since 1970, Congress has passed a number of major statutes that have assigned and expanded responsibilities to EPA in initiating and carrying out specific environmental programs. The enacted legislation includes, but is not limited to: the Clean Air Act (CAA); Clean Water Act (CWA); Safe Drinking Water Act (SDWA); Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); and the Toxic Substances Control Act (TSCA).

As outlined in the 2006-2011 Strategic Plan, EPA established specific goals, objectives and sub-objectives in five major areas of focus: Clean Air and Global Climate Change; Clean and Safe Water; Land Preservation and Restoration; Healthy Communities and Ecosystems; and Compliance and Environmental Stewardship. In each of these major goals, EPA's network of laboratories plays a critical scientific and technical role. EPA's laboratories provide crucial support to the environmental programs in achieving results and meeting objectives, by performing analytical measurements to determine the presence and extent of known or potential contaminants in the environment. They develop monitoring technologies and testing procedures. Our laboratories evaluate exposure and

risk to humans and ecosystems, and provide ways to minimize or eliminate these risks. They also provide the scientific and technical information needed to make informed decisions on a multitude of environmental and regulatory issues. Collectively, EPA's laboratory network is science-focused, and is continually advancing environmental science through its diverse activities and accomplishments. These contributions are essential in meeting EPA's goals and objectives.

2.2 Purpose of Near-Term Study

Sound science lies at the heart of EPA's mission. The Agency must rely on innovative research, accurate measurements, and effective technology to implement its programs and protect the environment and human health. Without sound science and data, EPA cannot set environmental and health standards, clean up contaminated sites, measure ambient air and water quality conditions, or identify the new technologies or practices that will reduce releases into the environment. A principal source of EPA's science is its own laboratories.

As announced by Assistant Administrator George Gray of EPA's Office of Research and Development (ORD) on March 15, 2007, this laboratory review has been divided into two parts: a long-term external study, and a near-term internal study. Over the long term, the Agency plans to engage an outside expert panel that will assess and evaluate EPA's laboratory network needs over the next 10 years, and characterize the ability of the existing network to meet those needs.

For the near-term, the Agency has conducted this internal study to identify opportunities to improve efficiency and effectiveness at EPA's laboratories. This study collects numerous best practices identified by EPA laboratory employees. These best practices include ways to reduce energy and water use, to purchase supplies collectively in bulk, to reduce the amount of chemicals used and disposed of by the laboratories, and to increase the extent to which resources are shared across multiple EPA laboratories. Generally, at least one laboratory within our network is already implementing each of the actions and best practices discussed in this report, with the probability of additional laboratories implementing them in the future. Many of these identified practices have multiple benefits: they avoid increased costs, are environmentally responsible, and often free up employees' time for attention to other matters.

EPA intends to share this collection of best practices widely within its laboratory community, and urges laboratory managers and employees to explore their effectiveness. Additionally, this report identifies some of the obstacles for implementation of these best practices at other EPA laboratories; and in some instances, contains recommendations for overcoming these obstacles.

2.3 Scope of Near-Term Study

Laboratories can take many different forms. Multiple-building facilities, individual buildings, small temporary structures, mobile vans, planes, and even research vessels can be used to accommodate laboratory functions. For the purposes of this near-term report, however, the focus is solely on fixed structural laboratory facilities within the Agency. Chapter 3.0 describes the elements of laboratory facilities in more detail, including the major inputs, activities, and outputs that comprise these facilities across their life cycle. From this life cycle perspective, virtually all of the opportunities identified in the near-term study focus on the operation and maintenance of existing laboratories. The near-term study does not focus on the design, construction, or decommissioning of EPA's laboratories because these elements are intrinsic to the lifetime of laboratory facilities.

2.4 Organization of Report on the Near-Term Study

This report consists of five chapters and six appendices; its organization is described in Exhibit 3.

Exhibit 3. Organization of Report on the Near-Term Study

Chapter	Description and Key Concepts
1.0. Executive Summary	Gives a brief overview of the crucial elements of this study: purpose and justification for the report, methodology, summary and next steps.
2.0. Introduction	Introduces key background concepts for this report, including EPA laboratories and the Agency's mission, and gives a more in-depth purpose and scope for the study.
3.0. Laboratory Facilities, Buildings, and Infrastructure	Briefly describes fundamental attributes of the built environment that supports EPA's laboratory network; key concepts explained in this chapter include the elements and systems integrated in a typical laboratory facility; life-cycle management of laboratory facilities; and recent legislation, executive orders, and partnerships that affect EPA laboratory facilities.
4.0. Opportunities to Improve Efficiency and Effectiveness	Describes the opportunities, actions, and best practices that improve laboratory efficiency and effectiveness. The opportunities are divided into seven sections: energy use reduction, efficient purchasing/strategic sourcing of equipment and supplies, chemical resource management and waste reduction, water conservation, resource sharing, analytic procedures, and other significant initiatives.
5.0. Summary and Next Steps	Highlights commonsense actions and best practices from the near-term study and recommends "next steps" to communicate and apply information about the highest-value opportunities.
Appendix 1.0: Acronyms/ Abbreviations	Contains an alphabetical list of the acronyms and abbreviations used throughout the report.
Appendix 2.0: Functions across EPA's Laboratory Network	Illustrates the functions of EPA's laboratory network.
Appendix 3.0: Congressional Statutes Related to EPA's Mission and Responsibilities	Provides a chronological list of federal statutes that relate to EPA's mission and responsibilities.
Appendix 4.0: EPA's Laboratory Facilities and Buildings	Details EPA's laboratory facilities and buildings.
Appendix 5.0: Questions for EPA Laboratories	Presents the questions distributed to EPA laboratory employees about location-specific efficiency and effectiveness measures.
Appendix 6.0: Laboratory Suggestion Database	Contains the 516 suggestions for effectiveness and efficiency improvements identified by EPA employees.

3.0
Laboratory Facilities, Buildings, and Infrastructure

The previous chapter describes the essential contributions that EPA laboratories make to help EPA accomplish its mission. This chapter presents an overview of the structure and function of EPA laboratories—including the "built environment" that supports laboratory contributions—and presents simple life-cycle concepts central to the design of sustainable and efficient laboratory facilities.

3.1 EPA's Laboratory Network: Functions, Locations, and Organization

Contributions made by laboratory scientists and technicians create the scientific foundation for EPA decisions, actions, and communication with the public and stakeholders. These scientific contributions are essential for understanding complex environmental processes, measuring the condition of the environment, and making decisions about standards that protect human health and the environment. Because of its world-class scientists and excellent laboratory capabilities, EPA is one of only a few federal agencies in the United States with the ability to integrate the results of laboratory activities with risk assessment, risk management, and the development of national standards.

The functions performed by EPA's laboratory network help the Agency respond to statutory requirements, executive orders from the Office of the President, and Presidential directives. Laboratories have been part of EPA since its founding in 1970; their responsibilities have expanded significantly since that time. In the past five years alone, several Presidential directives for homeland security and three congressional statutes (the Public Health Security and Bioterrorism Preparedness and Response Act of 2002, the Energy Policy Act of 2005, and the Energy Independence and Security Act of 2007) have added significantly to laboratory responsibilities at EPA. Appendix 2.0 lists and briefly describes the functions performed by EPA laboratories.

EPA laboratory facilities are designed with different objectives in mind. Regional laboratories provide a wide variety of analytical services to support enforcement, monitoring and other environmental programs in their respective Regions, states, and Tribal areas. National program laboratories implement many of the Agency's regulatory programs, support specific voluntary programs, and provide direct scientific support to their respective national program offices. Research laboratories focus primarily on core and problem-driven research[2] to provide the new and applied knowledge needed by EPA programs to understand complex environmental systems and processes, to inform environmental decisions, and to develop protective standards. It is important to recognize that—as a result of these three different objectives—laboratory design, systems, and functions vary significantly across the Agency's laboratory facilities.

EPA laboratory facilities are located in many different states across the country (see Appendix 4.0). EPA owns some of these facilities and leases others. The decision to own or lease laboratory facilities has a significant impact on the Agency's ability to operate and maintain the facility in the most efficient manner. For example, in leased laboratory space, improvements in energy performance and efficiency are required to be worked into the lease provisions, and therefore cannot be implemented without intensive owner cooperation. Though EPA can reduce its energy intensity at leased facilities and see demonstrated cost savings through reduced utility invoices, EPA does not receive any operational or maintenance savings, nor receive any credit for updating or improving the overall facility value—even though the improved energy technology or best practice may have been developed by EPA laboratory scientists and facility managers.

3.2 Understanding the Built Environment that Sustains Laboratory Contributions

The term *built environment* refers to the buildings, facilities, and special structures that house laboratory systems and functions. In addition to working in fixed laboratory facilities, EPA scientists also work at field locations where they collect environmental samples or make in-situ measurements, and sometimes use mobile facilities that can be taken to a site of interest.

[2]Building a Foundation for Sound Environmental Decisions. National Academy of Sciences Committee on Research Opportunities and Priorities for EPA (NRC, 1997), pages 16-17.

The built environment plays an essential role in supporting the Agency's laboratory systems and functions. It sustains and integrates many elements—including information systems; systems for conditioning, delivering, and exhausting laboratory air; sophisticated laboratory instruments, equipment, and technologies; laboratory chemicals, supplies, and gases; field sampling platforms and remote sensing instruments; electrical and mechanical systems; and resource recovery processes.

Scientific and research laboratories are among the most complex facilities in the United States. The design, construction, and management challenges for laboratory facilities are so significant that a number of federal commissions have prepared guidance on these issues.[3] For example, laboratories frequently consume a very large amount of energy—typically from five to ten times more energy per square foot than office buildings.[4] This puts a premium on sustainable design of laboratory buildings and systems to reduce energy use and minimize energy losses. Laboratories also have other special requirements for high purity air and water, recovery and reuse of chemicals, and constant temperature and humidity.

3.3 Life-Cycle Management of Laboratory Facilities and Infrastructure

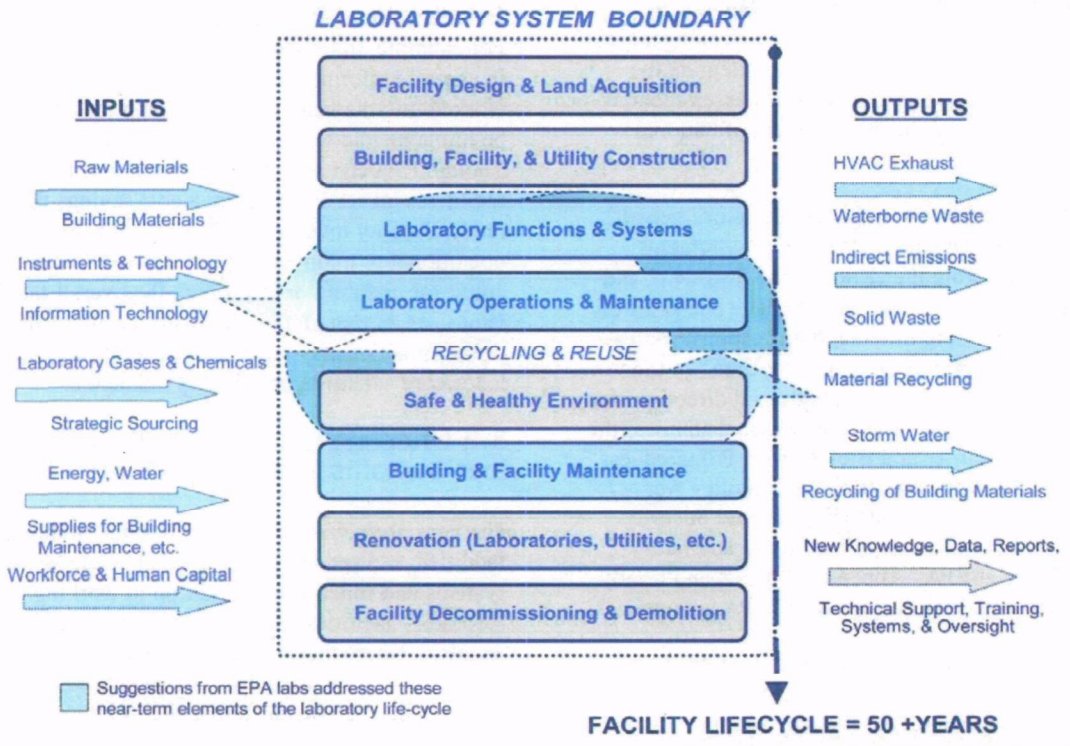
During the past 20 years, the growing importance of laboratory facilities in the United States—coupled with laws enacted by Congress[5] and executive orders issued by the Office of the President—stimulated laboratory architects, engineers, and managers to adopt a *life-cycle approach* when making decisions about laboratory buildings and facilities. The term "life-cycle" refers to the major inputs, activities, and outputs associated with

[3] For example, see Laboratory Design, Construction, and Renovation: Participants, Process, and Product. National Research Council Committee on Physical Sciences, Mathematics, and Applications. (NRC, 2000), page 1.

[4] *Laboratories for the 21st Century: Program Overview.* U.S. Environmental Protection Agency and Federal Energy Management Program. January 2004, page 1.

[5] For example, see the Energy Policy Act (EPAct) of 2005, P.L. 109-58, 42 U.S.C. 15801 (2005) and the Energy Independence and Security Act (EISA) of 2007, 42 U.S.C. 17001 (2007).

Exhibit 4. A Simple Life-Cycle Perspective for Sustainable and Efficient Laboratories



a laboratory's facilities, buildings, systems, functions, and materials across its lifetime.[6] Today, these life-cycle concepts help form the core of sustainable and efficient facility design. Exhibit 4 presents a simple conceptual framework that illustrates important aspects of the life-cycle approach for sustainable laboratories. Exhibit 4 indicates that the economic lifetime for laboratory facilities may extend beyond 50 years. This economic lifetime figures prominently in decisions about sustainable design of laboratory facilities, buildings, and systems—for example, in the selection of building materials that will be durable over the projected facility's lifetime.

The elements illustrated within the laboratory system boundary in Exhibit 4 are similar to sustainable design elements described during the past 10 years[7] by international architectural design and engineering firms and by the American Institute of Architects Committee on the Environment.

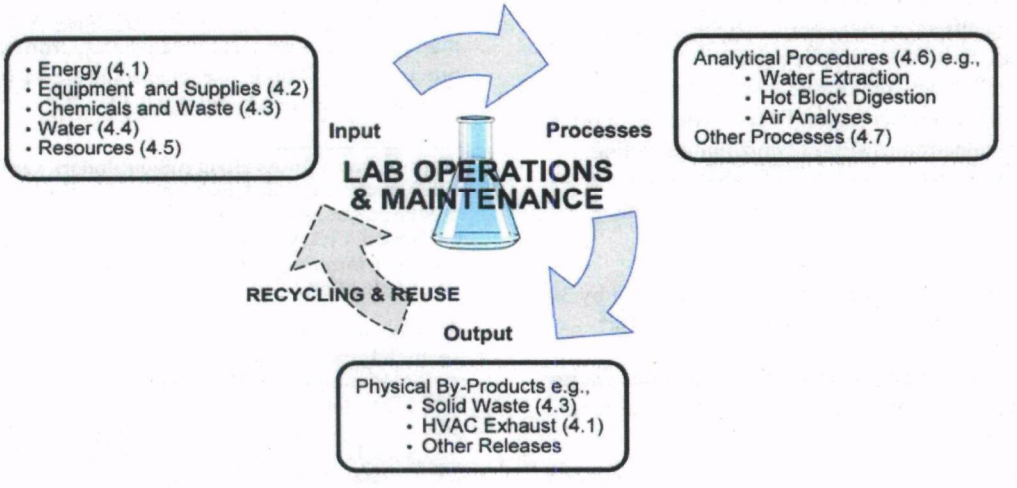
Most of the near-term opportunities described in our report are based on 516 suggestions we received from EPA employees at 27 agency laboratories. In general, these employee suggestions do not focus on long-term laboratory issues such as facility design, land acquisition, and building construction. This is because near-term opportunities to improve laboratory efficiency necessarily focus on facility inputs, outputs, and processes rather than on long-term capital investment.

After reviewing the 516 suggestions from EPA employees, we organized them into seven categories: energy use reduction, efficient purchasing and strategic sourcing of equipment and supplies, chemical resource management and waste reduction, water conservation, resource sharing, analytic procedures, and other significant initiatives. Exhibit 5 (below).

[6] *Life Cycle Assessment: Inventory Guidelines and Principles*. U.S. Environmental Protection Agency, Office of Research and Development. Cincinnati, Ohio, USA. (EPA/600/R-92/245) 1993.

[7] For example, see The HOK Guidebook to Sustainable Design, pages 3-5. New York: John Wiley & Sons, 2000.

Exhibit 5. Focus of Near-term Laboratory Study — Seven Categories of Actions and Best Practices that Improve Efficiency and Effectiveness



illustrates how these categories correspond to the inputs, processes, and outputs involved in the life-cycle of a laboratory facility. In this exhibit, the numbers in parentheses (e.g., 4.1, 4.2) correspond to the sections of Chapter 4.0 that provide a more detailed discussion about these categories.

3.4 Recent Legislation, Executive Orders, Federal Partnerships, and Voluntary Programs that Affect Laboratory Facilities

The suggestions identified by EPA employees are not isolated efforts; many of them help EPA laboratories respond to federal government-wide initiatives that aim to reduce the environmental footprint of government facilities. In particular, many of the best practices documented in this report emerged from efforts to "green the government," to establish Environmental Management Systems (EMSs) at government facilities, and to make strategic government purchases. EPA laboratories have been very active participants and leaders in these initiatives.

Under a series of executive orders, federal agencies are required to adopt energy, water consumption, and environmental management goals within their facilities. For example, on January 24, 2007, *Executive Order 13423 (entitled Strengthening Federal Environmental, Energy, and Transportation Management)* was issued by the Office of the President. Extending policy in earlier executive orders aimed at "greening the government" and in the Energy Policy Act of 2005, *Executive Order 13423* requires federal agencies to lead by example in advancing the nation's energy security and environmental performance. Federal agencies are required to achieve goals in the areas of energy efficiency, renewable energy, sustainable buildings, water conservation, fleets, toxics reductions, acquisition, electronics stewardship, and recycling. Specific and ambitious goals established under *Executive Order 13423* for the federal government include:

- Reducing facility energy use per square foot by 30 percent by the end of Fiscal Year (FY) 2015;[8]
- Requiring at least half of current renewable energy purchases to come from new, renewable sources;
- Reducing water consumption 16 percent by 2015;
- Increasing purchases of alternative fuel, hybrid, and plug-in hybrid vehicles when commercially available; and
- Reducing the use of chemicals and toxic materials and purchasing lower-risk chemicals and toxic materials.

In an effort to address environmental responsibilities and improve organizational efficiency, EPA also has been involved in a wide range of voluntary activities to facilitate the adoption of EMSs over the last several years. In October 2006, EPA issued its Commitment to the Integration and Utilization of Environmental Management Systems, pledging to "integrate and utilize EMS as the framework for enhancing its environmental performance, reducing its environmental footprint to be sufficient to carry out the Agency's mission, and demonstrating its leadership in environmental stewardship."[9]

To date, EPA has implemented EMSs at 32 sites, including the 10 regional laboratories, seven ORD laboratories, two OAR laboratories, and two OPPTS laboratories. EPA is pursuing EMS implementation at additional sites, including three more laboratories: the National Enforcement Investigations Center, the Radiation and Indoor Environments National Laboratory, and the OPPTS Environmental Chemistry Laboratory. Fifty percent of the Agency-wide EMS objectives for calendar years 2006 and 2007 are laboratory-specific.[10] These include explicit targets for laboratories to meet under the objectives of energy management, chemical management, affirmative procurement, vehicle use, electronic stewardship, recycling, and sustainable design.

[8] Note: The 30% energy reduction requirement became law in December 2007 under the Energy Independence and Security Act (EISA) of 2007, 42 U.S.C. 17001 (2007).

[9] Memorandum for Assistant Administrators, General Counsel, Inspector General, Chief Financial Officer, Associate Administrators, and Regional Administrators from Stephen L. Johnson, EPA Administrator, "*Commitment to the Integration and Utilization of Environmental Management Systems.*" October 16, 2006.

[10] Memorandum for Assistant Administrators, General Counsel, Inspector General, Chief Financial Officer, Associate Administrators, Regional Administrators, and Staff Office Directors from Luis Luna, Assistant Administrator for EPA's Office of Administration and Resources Management "*Agency EMS Objectives, Targets, and Metrics for CYs 06 and 07*," December 21, 2006. Attachment 1 — Final SHEMD Agencywide EMS Objectives, Targets, and Metrics.

A third government initiative reflected in this report's best practices is strategic sourcing for government procurements. In responding to the Office of Management and Budget's (OMB's) 2005 strategic sourcing acquisition initiative,[11] EPA has identified strategic sourcing of laboratory supplies as a priority opportunity for implementing the "green" purchasing requirements of many federal laws, regulations, and Executive Orders.

[11]Memorandum for Chief Acquisition Officers, Chief Financial Officers, and Chief Information Officers from Clay Johnson III, Deputy Director for Management, OMB; "Implementing Strategic Sourcing." May 20, 2005. [Available at http://www.whitehouse.gov/omb/procurement/comp_src/implementing_strategic_sourcing.pdf]

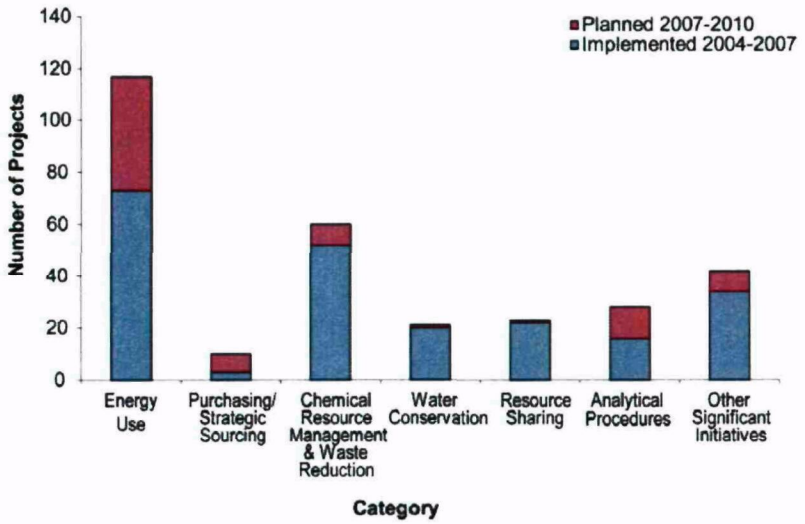
The EPA Office of Administration and Resources Management (OARM) plays a central role in facilities management, sustainable development, and environmental compliance. Many of the actions in this report are the result of partnerships between OARM and the laboratories to develop programs for acquisition, and to improve the energy efficiency of older buildings. OARM support played an important and often essential role in bringing about many of the actions described in Chapter 4.0.

4.0
Opportunities to Improve Efficiency and Effectiveness

This chapter describes opportunities, actions, and best practices for improving laboratory efficiency and effectiveness based on the 516 suggestions identified by EPA laboratory employees. Appendix 6.0 presents a list of these suggestions and the information received with each.

The suggestions have been organized into seven sections: energy use reduction, efficient purchasing/strategic sourcing of equipment and supplies, chemical resource management and waste reduction, water conservation, resource sharing, analytic procedures, and other significant initiatives. Within each of these sections, actions or best practices implemented from 2004 through 2007 that appear to have significant and widespread value were identified, as well as opportunities planned for 2007 through 2010 that offer similar value. As Exhibit 6 below illustrates, more than half of the actions and best practices described in this report have been implemented in the 2004-2007 time period.

Exhibit 6. Distribution of 516 Actions and Best Practices across Time



Frequently, the actions or best practices described have multiple benefits. They often avoid cost increases, are environmentally responsible, and/or enable employees to work more effectively or efficiently. Generally, each of these actions or best practices has been implemented in at least one EPA laboratory and could be implemented at others.

A review of Appendix 6.0 indicates that the information identified by EPA employees does not include engineering studies or related quantitative analyses. Qualitative indicators are included where available. For example, some suggestions and related information described in *4.1 Energy Use Reduction include a range of potential reductions in energy usage and associated cost savings*. These quantitative indicators are available

in part because EPA has conducted studies in response to recent legislation (e.g., the EPAct) and executive orders (e.g., *Executive Order 13423*).

The information described in *4.2 Efficient Purchasing/ Strategic Sourcing of Equipment and Supplies*, refers to efficient acquisition of selected equipment and services. This section was not based directly on the 516 suggestions in Appendix 6.0, but rather was gathered by the Agency's strategic sourcing team in response to a May 20, 2005 acquisition initiative (referred to as strategic sourcing) from the OMB.

4.1 Energy Use Reduction

4.1.1 Introduction and Key Concepts

4.1.1.1 Background

While EPA occupies more than 200 facilities around the country, the Agency is only responsible for tracking and reporting energy usage for 34 facilities in which EPA has direct control over utility bills. For the remaining facilities, the General Services Administration (GSA) charges back EPA for its utility usage, and therefore is responsible for tracking and reporting energy usage.

This section identifies areas where Agency investments have been implemented or are planned to be implemented in the area of energy reduction. Cost avoidance and improved efficiencies are addressed specifically as provided by the various laboratories whenever possible. Further information may be required since this report does not attempt to provide a complete quantitative analysis of all energy projects outlined in Exhibit 8 and Exhibit 9.

4.1.1.2 Impact of Legislation

The Energy Policy Act of 2005 (EPAct) and the Energy Independence and Security Act of 2007 (EISA) influence how we manage energy resources among the facilities identified in this report. EPA laboratories stand out as the most energy intensive facilities within the Agency, and the seven highest energy-consuming laboratories use nearly 70 percent of the energy the Agency purchases. While great strides have been made reducing energy use in these facilities, more must be done to comply with the EPAct and EISA.

Executive Orders issued by the President also influence the way we efficiently allocate energy across EPA facilities. For example, *Executive Order 13423* addresses energy efficiency at federal agencies. The Order states[12] "improve energy efficiency and reduce greenhouse gas emissions of the Agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline of the Agency's fiscal year 2003."

EPA's energy use in FY 2006 at reporting laboratories was 1,213,354 MM British Thermal Units (BTUs) and cost the Agency $21,296,580 (not including the cost of purchased renewable energy certificates). To meet the energy reduction goals established by the EPAct, EISA, and Executive Order 13423, EPA must reduce energy consumption across its facilities by an average of 3% per year through the year 2015. This equates to a total reduction of 30% from EPA's FY 2003 baseline.

4.1.1.3 Defining Strategic Projects and Programs

By definition, a project is considered a "strategic project" when it reduces EPA's national energy use by ¼ of 1 percent. Each strategic project would save the Agency roughly 3,033 MM BTUs, 889,034 kilowatt-hours, or 2,942 MCF of natural gas, which translates into approximately $54,000 in energy savings. EPA would have to complete roughly 130 such projects of this size to meet energy reduction objectives.[13]

Each individual strategic project has the potential to generate significant reductions in energy use for the Agency. In contrast, strategic programs generate smaller savings as individual actions but may cumulatively produce significant savings if implemented across a number of EPA's laboratories. Any energy saving action that results in less than $50,000 of avoided costs and can be easily implemented across EPA's laboratories to generate greater savings is considered a "strategic program." The goal of both strategic projects and programs is to support the Agency in meeting mandates to cut overall energy use by 30 percent by October 2015, and to increase the proportion of renewable energy used to at least 7.5 percent by October 2012.[14]

EPA's laboratories have engaged in a variety of strategic projects and programs aimed at achieving greater energy efficiency. Exhibit 6 illustrates that the laboratories identified 235 implemented, planned,

[12]See section 2, paragraph (a) of *Executive Order 13423* issued on January 24, 2007.

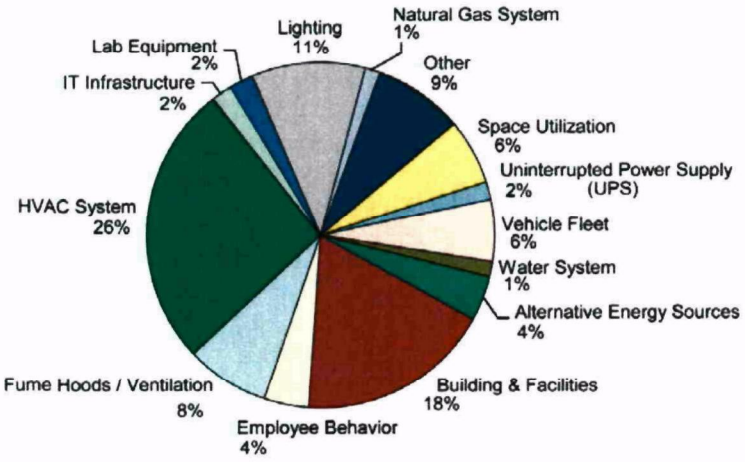
[13]Information provided by EPA OARM Facilities, August 2007.

[14]See section 203, paragraph (a) of Energy Policy Act of 2005 signed on August 8, 2005.

and recommended actions related to the reduction of laboratory energy use. These projects and programs involve a variety of aspects of laboratory facilities and operations, as illustrated by Exhibit 7, "Diversity of Energy Use Reduction Initiatives in Response to Location-Specific Cost Savings Questions."

This section highlights the most important opportunities for labs to reduce their energy consumption. The survey responses indicate that the most significant strategic projects involve recommissioning, retro commissioning, and/or continuous commissioning; converting laboratory heating, ventilation, and air conditioning (HVAC) systems; and implementing Energy Savings Performance Contracts (ESPCs); while the most significant strategic programs involve operations and maintenance best practices that can be captured in energy management plans (EMPs). The most illustrative examples of these types of projects and programs are described in this section and summarized in Exhibits 9 and 10.

Exhibit 7. Diversity of Energy Use Reduction Initiatives in Response to Location-Specific Cost Savings Questions



(Total number of energy use reduction initiatives = 235.)

4.1.2 Opportunities for Improvement of Energy Usage

4.1.2.1 Recommissioning/Retro Commissioning/Continuous Commissioning and Conversion of Heating, Ventilation, and Air Conditioning (HVAC) Systems

Recommissioning, retro commissioning and continuous commissioning are defined in the EPA Facilities Manual.[15] Commissioning of HVAC systems at EPA's laboratories offers opportunities for significant cost savings and improvements in energy efficiency. EPA laboratories operate with complex, energy-intensive equipment requiring precise air temperature, humidity, and flow. Air balance is also critical for equipment and laboratories. Some EPA laboratories use computerized building automation systems that rely on continuously adjusting space and equipment sensors, in some cases thousands in a building, to maintain desired conditions. If any are out of calibration, it can have a dramatic impact on energy consumption and required space conditions.

[15]EPA Facilities Manual, Volume 2, Architecture and Engineering Guidelines," Appendix B Commissioning Guidelines, July 2004 [http://www.epa.gov/greeningepa/content/ae-guidelines_appendixb.pdf].

Recommissioning laboratories will ensure that all buildings' HVAC systems operate at the maximum efficiency possible and with all system capabilities fully realized.

Recommissioning, retro commissioning and/or continuous commissioning can be performed with either variable air volume (VAV) or continuous air volume (CV) HVAC systems. For VAV systems, the recommissioning, retro commissioning and/or continuous commissioning process involves rebalancing supply and exhaust airflows, inspecting all controls, valves, and sensors, and matching the building automation system (if in place) to actual airflows. For CV systems, the recommissioning process often results in resetting or recalibrating fume hoods, replacing mechanical parts, and reducing airflow (while still meeting EPA's Safety, Health and Environmental Management Division [SHEMD] and the Occupational Safety and Health Administration [OSHA] guidelines). Performing fume hood certifications in conjunction with HVAC system recommissioning helps to maximize gains. During annual certification, it is recommended that all laboratories (especially CV) maximize potential savings and examine the "best management practices" when calibrating fume hoods (e.g., consider 80-85 fpm [feet per minute] versus the 100 fpm traditionally used). EPA and OSHA guidelines for fume hood operations are a minimum of 80 fpm across the open hood face area.

Existing hoods in EPA laboratories have stops that restrict opening the hood that must be used at ALL laboratories. In labs with VAV HVAC systems, laboratory technicians are trained to keep the hoods closed to the maximum extent possible so that substantial energy savings can be achieved. The recommended approach is to design the hoods for a maximum sash opening of 15 to 18 inches at 80 to 90 fpm. Note that this must be done in conjunction with containment testing to ensure worker safety. Fume hoods that are not currently in use, or may not be needed in the near term, should be locked out and airflow reduced or decommissioned. (Refer to Exhibit 8, item 9 at the end of this section.)

The need for recommissioning, retro commissioning and/or continuous commissioning has been identified at a number of EPA laboratories. Locations that have recently undergone recommissioning have demonstrated significant savings. If efficiency measures are instituted during future recommissioning activities, there are several locations where significant savings could also be achieved. Many of these measures are highly replicable with potential for EPA-wide implementation. As a result, recommissioning could produce significant cumulative savings in dollars and BTUs for the Agency.

Opportunities also exist for laboratories to convert their CV systems to VAV systems. This is a much more cost-intensive process, but can potentially produce greater savings associated with greater efficiency. Complete system conversion requires retrofitting of all HVAC ductwork for laboratory supply and exhaust with control valves and electronic modulating reheat control. Installation of fume hood sash and operator sensors and airflow/velocity sensors is recommended. Existing facilities would require that the certified air balancing be confirmed for safety requirements of fume-hood operations as well as lab climate condition requirements.

Recommissioning, retro commissioning and/or continuous commissioning and converting HVAC systems offer excellent opportunities for most of EPA's labs to reduce energy consumption. However, both processes are cost-intensive and require extensive engineering analyses prior to implementation. Further study will be necessary before either process could be broadly applied across EPA's laboratory network.

4.1.2.2 Recommissioning VAV Systems

The Region 4 lab in Athens, Georgia has identified the need to implement setbacks—used to automatically reset the building temperature during times when it is unoccupied—as a part of recommissioning its VAV system, thereby reducing the cost and energy use associated with heating and cooling. The Region 4 laboratory has proposed incorporating nighttime and weekend setbacks in its energy management plan, and has estimated that these energy saving actions could save approximately $30,000 per year. Setbacks are relatively simple to implement and can easily be applied across EPA's laboratories. Payback periods are usually only one to two years.

The Region 3 laboratory and OPPTS's Environmental Science Center, co-located in Fort Meade, Maryland, have proposed adjusting steam reducing-stations from 15 pounds per square inch (psi) to 5-7 psi per operation, reducing boiler load and demand. Although the potential savings due to retrofitting activities have not been estimated, it is expected that the payback period would only be one to two years.

The Region 7 Science and Technology Center in Kansas City, Kansas recently underwent an operation and maintenance evaluation performed by contractors from the Sustainable Facilities Practices Branch (OARM) at Headquarters. The focus of the evaluation was on energy use, and a strong need was identified for recommissioning the VAV HVAC system. Depending upon the availability of funding and the recommendations of the resulting report, the Region intends to pursue the implementation of operational changes to enhance the efficiency of the HVAC system and reduce energy consumption. These changes are likely to involve readjusting supply and exhaust airflows to meet laboratory needs during occupied and unoccupied periods and matching the building automation system with actual airflows. Region 7 anticipates that these recommissioning efforts could increase the laboratory's energy efficiency by 20% or more, with a payback period of only one to two years.

The National Enforcement Investigations Center (OECA) in Denver, Colorado has also undergone an operation and maintenance review of its energy consuming systems in 2006. Following the review, the Center initiated recommissioning of its HVAC system, with total energy and cost savings estimated at $52,000. Part of the recommissioning focused on the Center's hot water pumps, which are programmed to stay off until the outside air temperature drops below 35°F (or until the hot water coil valve starts to open); freeze protection has been achieved by controlling the hot water valves to maintain a reasonable temperature (60°F). These modifications have reduced unoccupied hot water flow, and the resulting pump energy savings have been estimated at $2,290 per year or 21,900 kWh per year.

4.1.2.3 Recommissioning Constant Volume (CV) Systems

The Andrew W. Breidenbach Environmental Research Center (ORD) in Cincinnati, Ohio undertook recommissioning of its CV HVAC system in 1998. The major objective was to rebalance the system and reduce fume hood exhaust air volumes down to 80 fpm when fully open, eliminating the introduction of unconditioned, humid air and the amount of outside air infiltration, thereby reducing the need to overcool/ reheat for dehumidification. The Center also achieved a 20% reduction in fume hood exhaust. Starting in 2007, the Center began major renovation efforts, and many efficiency measures are undergoing implementation throughout the facility. This project will include the conversion of all of the fume hoods from CV to VAV systems. The Agency has committed funding for the Center's renovation through 2015, with significant energy and cost savings expected.

The Region 6 lab in Houston, Texas has proposed recalibrating its fume hoods, currently calibrated at over 100 fpm per the original lease requirements, as a part of recommissioning its CV HVAC system. EPA's Safety, Health and Environmental Management Division and OSHA guidelines require minimum settings between 80-120 fpm per hood. By recalibrating the fume hoods at 85 fpm, the Region has estimated that energy consumption could be reduced by up to 5%, amounting to savings of approximately $300 per hood per year. Prior to recalibration, the Region would need to ensure that all safety and health standards and regulations could be met. Although the implementation cost is estimated at $4,000-$5,000, the payback period is expected to be less than one year.

4.1.2.4 Conversion of EPA Laboratories from Constant Volume to Variable Air Volume Systems

Most of EPA's laboratories operate with CV fume hood systems, meaning that for each standard fume hood, whether open or closed, 1,000 to 1,200 cubic feet per minute (CFM) of conditioned air must be supplied into a lab to replace the air being exhausted outside through the fume hood. In a location like Las Vegas or Houston, it takes considerable energy to cool and/or dehumidify such large quantities of air. Modern laboratory design has shifted to VAV hoods, where the amount of air exhausted through the fume hood corresponds to the level (or "openness") of the fume hood sash. For example, for a typical VAV fume hood, 1,000 CFM to 1,200 CFM of air is required when the fume hood is open, whereas only 250 CFM of air is required when closed.

This simple example demonstrates that rather than conditioning 1,000 CFM of air 24 hours per day for laboratory supply under a Constant Volume System, one could reduce the need to 250 CFM of air, 22 hours of the day (assuming two hours a day with the fume hood open to check an experiment underway), representing a savings of more than 70% of conditioned air. This is considered substantial energy savings for a laboratory.

Paybacks for conversion from CV to VAV can range from 10 to 30 years, making it best to schedule conversions at the end of the useful life of major infrastructure components like air handling units, control systems, exhaust systems, or during lab modernizations. In addition to complete conversions, system components can be changed out over time to

migrate the system towards VAV operation (replacing constant speed exhaust fans with variable speed drive fans, replacing air handlers with variable speed drives, etc.).

In Duluth, Minnesota, VAV conversion should reduce energy consumption by more than 20%, or more than $69,000 annually at FY 2006 energy prices. The Cincinnati Andrew W. Breidenbach Environmental Research Center infrastructure replacement project should reduce energy use 38.5%, representing $856,000 in annual energy savings.

4.1.2.5 Energy Savings Performance Contracts

Energy Savings Performance Contracts (ESPCs) are a way to upgrade mechanical systems of EPA laboratories without full funding from EPA building and facility appropriations. Under an ESPC, a contractor finances the redesign, upgrade, replacement and/or modernization of mechanical systems, which results in energy use reductions and energy cost savings. The Agency pays a significant portion or all of the energy cost savings to the ESPC contractor to finance the project costs. EPA laboratories in Ann Arbor, MI and Ada, OK offer examples of this approach. Under ESPCs, both laboratories reduced energy use by more than 40% and had substantial portions of their infrastructure replaced.

It is important to note that completing an ESPC may not reduce a facility's operating costs directly. Typically, the bulk if not all of the reductions in energy charges are paid to the ESPC contractor to finance the mechanical system upgrades. In addition, the ESPC contractor will control operations of the systems, and any future modifications to the mechanical systems for future lab changes must be negotiated with the ESPC contractor.

Where ESPCs are most helpful regarding operational costs is the avoided cost on future energy cost increases. Today's volatile energy markets have generally meant increasing fuel costs. If an ESPC saves 2,000,000 kilowatt hours of electricity per year at a particular lab, a two-cent increase in kilowatt costs means a $40,000 savings to that EPA lab by avoiding the use of, and thus the rising cost of, the energy.

The Ann Arbor ESPC, completed in April 2001, involved a comprehensive reconception and design of the laboratory's HVAC systems. The $10.5 million project replaced the laboratory's boilers and chillers, added rooftop air handling units with indirect evaporative cooling and heat recovery, a 200-kilowatt natural gas fuel cell, and a new direct digital control system.

The Ada ESPC involved the installation of a ground source heat pump system, which uses the constant temperature of the earth to accept or reject heat to provide cooling and heating to the building. The Ada project also included the conversion of Ada's fume hoods and mechanical systems from CV to VAV systems. The project value was $3.5 million.

The end result of both of these projects was that EPA did not have to fund the mechanical systems out of its limited building and facility (B&F) dollars. A comprehensive mechanical upgrade was achieved in both cases, and each laboratory now uses considerably less energy and water.

All these benefits come with some constraints. OAR signed a 25-year contract with the ESPC contractor, NORESCO, and any significant change in operations, building additions, or major mechanical system changes involve contract negotiations with NORESCO. ORD signed a similar long-term contract with its ESPC contractor, Johnson Controls, Inc. Because the profit potential is limited, ESPC contractors may not be motivated to renegotiate contracts to accommodate changes small in scope, therefore future flexibility at each lab may be impeded.

Currently EPA is in the preliminary stages of ESPC discussions for two projects: heat recovery in Research Triangle Park (RTP) New Main, and mechanical and control system upgrades at the Central Utility Plant that serves EPA and the National Institute of Environmental Health Sciences (NIEHS) facilities in RTP.

Share-in-savings contracts are encouraged and facility managers or laboratory directors should contact OARM for further assistance. Seeking long-term contracts with energy or utility companies or other business partners to improve the efficiency of heating and cooling, lighting, and other systems is a sound business practice. Companies initially pay for improvements upfront, and then keep most or all of the energy cost savings that result from the improvements. In an August 3, 2007 memo to agency heads, Edwin Piñero, White House Federal Environmental Executive, says share-in-savings contracts will help agencies meet mandates to cut overall energy use.

4.1.2.6 Operations and Maintenance Best Practices Assessment

The Sustainable Facilities Practices Branch has commissioned a number of Operations and Maintenance assessments for EPA facilities. Operations and Maintenance (O&M) assessments will identify the best opportunities for optimizing energy-using systems and improving O&M practices. It provides the starting point for evaluating the present O&M program and a basis for understanding which O&M improvements are most cost effective to implement. Refer to Exhibit 9 for the information contained in this section.

The goal of an assessment is to:

- Develop recommendations for optimizing building performance to reduce energy waste.
- Develop recommendations for optimizing building performance and equipment control to save energy and maintain comfort.
- Evaluate Building Automation System (BAS) capabilities and recommend ways to optimize control strategies to improve comfort and save energy.
- Evaluate the current computerized maintenance management system (CMMS) for adequate information such as equipment inventory, attainable and realistic PM schedules and adequate PM tasks.
- Recommend improvements to or addition of CMMS.
- Investigate specific problem areas of the building and/or problematic equipment.
- Recommend energy-efficient equipment upgrades for further investigation.
- Recommend training requirements for building staff in the assessment process to increase their skill in tracking the results of O&M and energy-efficient improvements.
- Conduct a cost and benefit analysis for implementing recommended O&M improvements.

For facilities that have yet to have an O&M assessment performed, including site-specific recommendations, more generic actions that could be taken are as follows:

- Make sure air handling filters are clean.
- Ensure belts are properly tensioned and bearings are lubricated.
- Turn off lighting and equipment when not in use.
- Optimize temperature set points to the extent possible without compromising comfort.
- Utilize temperature setbacks and/or shut off air handlers during evenings and weekends.
- Inspect steam traps for proper operation; repair compressed air leaks.
- Upgrade to T-8 fluorescent tubes and electronic ballasts when possible.
- Use high efficiency electric motors when replacement is required.
- Use employee awareness programs to turn off computers and provide assistance with recommendations above.

One major focus of O&M evaluations of laboratories is the functioning of laboratory fume hoods, which is extremely energy-intensive, particularly when the hoods are not operating properly. Fume hood performance at EPA laboratories is checked periodically to ensure operating parameters are met. When correct face velocities have been achieved (80 fpm minimum), attention should be directed to external factors such as hood location and room ventilation as well as maximum operating efficiency (i.e., best settings for energy usage as well as safety and health). Fume hoods at all EPA laboratories are required to be certified annually, as well as after any significant maintenance has been performed on the exhaust system or room air supply system. During annual and/or significant maintenance of fume hoods, personnel can yield immediate results and relatively fast paybacks by lowering face velocity (directly impacting Air Change per Hour [ACH] rates) when possible.

4.1.3 Conclusions and Key Recommendations

Best Management Practices discussed in this section that could be implemented with little or no cost could include:

- Setting fume hood sash heights at all EPA laboratories (whether CV or VAV systems);
- Standardizing fume hood calibrations to optimized energy/safety guidelines (e.g., 85 fpm); and
- Standardized maximization of ACH rates (e.g., four to six ACH rated).

All facilities are encouraged to undergo O&M evaluations and develop site-specific in-house energy management plans that incorporate the recommended best practices. These plans should include goals and targets to reduce energy use and costs to the lowest cost-effective levels while meeting mission objectives. In addition to the suggestions made in the previous section, these plans should establish guidelines on the use of personnel electrical equipment and appliances, after-hours access and use of the facilities, and any other location-specific guidelines as needed.

4.1.4 Implemented and Planned Improvement Tables

Exhibit 8. Energy Use Reduction: Laboratory Improvements Implemented, 2004-2007

Item	Brief Description	Lab Name/ Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	Manually closing the sash on the laboratory chemical fume hoods/ventilation	ORD/NERL/HEASD - RTP, NC	Approx. savings of $196,200/year ($900/ fume hood). Actual savings can be up to 60% with full compliance; up to $1,800/ hood/year and $900,000 total	Some
2	Replacement facilities underwent construction through the LEED Program	ORD/Gulf Ecology Division (NHEERL) - Gulf Breeze, FL	Savings $25,000-$50,000/year	Some
3	CRT computer monitors replaced with high efficiency flat screen LCD monitors	ORD/NERL/ Environmental Sciences Division - Las Vegas, NV	Flat screens use less energy and generate less heat; $8,000 projected total savings from 2004 -2011 20,000 kWh/year	All
4	Operation of the energy-consuming systems in the building was reviewed and improvement measures were developed	OECA/OCEFT/ National Enforcement Investigations Center - Denver, CO	Combined with fume hood certification, this generally has good short term paybacks (1-2 years) if systems are too old to be adjusted; estimated cumulative energy and cost savings of $52,000	All
5	Implementation of EPA's "Top Ten Energy Savings Operations and Maintenance Practices"	ORD/Ecosystems Research Division (NERL) - Athens, GA	Reduced energy profile 8+% in FY06; unfortunately, due to increasing energy costs, their actual cost of energy increased around 5%, but this leads to an avoided cost	All
6	Use of free cooling during colder seasons, reducing hot water loop temperatures and increasing chilled water temperatures	OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	Savings of approx. $180,000 in FY06; 24% reduction from FY06	Some

Item	Brief Description	Lab Name/ Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
7	Installed 23 fan-powered air terminals, significantly enhancing the heat distribution in perimeter offices	Region 1 (NERL) - Chelmsford, MA	Approx. $187,000/year; 7,047 million BTUs saved in FY06 (30% reduction over past two fiscal years)	Some
8	Replacement of old boilers, chillers, roof top units with new, more efficient equipment	ORD/NERL/ Environmental Sciences Division - Las Vegas, NV	Savings of $160,000 from 2004 to present; $480,000 projected total savings from 2004-2011; 575,000 kWh electricity/year; 30,900 therms natural gas/ year Costs went up 9.1% in FY05 and 2.6% in FY06, while their energy use went up 9.8% in FY05 and down 10% in FY06.	Some
9	Chemical fume hoods not in use have been locked out and airflows reduced	ORD/NERL/HEASD - RTP, NC	Savings of $3,000/hood/year; approx. $10,800/year (40% reduction)	Some
10	Renovated building equipped with a building automation system	OECA/OCEFT/ National Enforcement Investigations Center - Denver, CO	Savings of 10-15% with further additional savings available with additional capital investments	Some
11	Installation of ground source heat pump via ESPC	ORD/Ground Water & Ecosystems Restoration Division (NRMRL) - Ada, OK	Contract show savings exceeding $200,000 for both FY05 and FY06, $270,000 in first year (similar results second year); 44% reduction in FY 2005 (similar results in FY 2006)	Some
12	Office and laboratory lights are shut off at the end of each workday	ORD/Ecosystems Research Division (NERL) - Athens, GA	Operation controls are even cheaper than the motion sensors typically associated with "green" lights upgrades—infinite payback; Could translate to $30,000-40,000/year	Some
13	Eliminated two warehouses from Page Road Grand Slam facility	OARM - RTP, NC	Page Road utilities are $1/sq. ft; saving 20,000 sq. ft translates to $20,000/year utility savings. Also estimated to save approximately $220,000 in annual lease costs.	Some
14	Recommissioned VAV Laboratories and air handling units	OARM - RTP, NC	$20,000-30,000/hood cost with $3,000/ hood savings; 34 billion BTUs (5% reduction) in FY06	Some
15	Replaced computer room air conditioners with state of the art hot aisle/cold aisle design that will use the energy efficient central plant for service	OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	Estimated savings of $12,000/year	Some

Item	Brief Description	Lab Name/ Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
16	Recommissioned chilled water, reduced single pass cooling equipment	ORD/Atlantic Ecology Division (NHEERL) - Narragansett, RI	Savings of $32,000/year (payback period less than eight years); 293,000 kWh electricity/year (20% reduction); 1,000,000 gallons of water/ year	Some
17	Deactivated refrigerators and freezers not in use	Office of Pesticides Programs, Environmental Chemistry Laboratory - St. Louis, MS	No quantification of savings provided	Some
18	Manually closing the sash on the laboratory chemical fume hoods/ventilation	Region 3 and OPP - Environmental Science Center, Fort Meade, MD	Helps in VAV laboratories; $2,000-3,000/year/hood savings for VAV hoods open versus closed	Some
19	Decommissioning of hoods not in use (put in standby)	Office of Pesticides Programs, Environmental Chemistry Laboratory - St. Louis, MS	Great when system can reduce supply and exhaust as hoods are hibernated; taking a hood out of service could be up to $5,000/year savings/hood	Some
20	New Annex I office space with a state-of-the-art, energy efficient VAV HVAC system	ORD/Andrew W. Breidenbach Environmental Research Center (NRMRL) - Cincinnati, OH	VAV systems for office and laboratories are standard practice and conserve energy	Some
21	Assessment of the energy-consuming systems was performed and improvement measures were implemented	OECA/OCEFT/ National Enforcement Investigations Center - Denver, CO	Resulting in estimated cumulative energy and cost savings of $52,000; savings of $3,400/year; 32,600 kWh electricity/year	All
22	Moved/consolidated contractor space into modern space; eliminated energy loads in building bays	Region 2, OSWER/ Environmental Response Team, and ORD/NRMRL - Edison, NJ	Savings of $13,500/year; 600 million BTUs/year; energy savings in these areas are offset by new loads	Some
23	Replaced six fume hoods with models to reduce airflow by approximately 25%, maintaining adequate capture and user safety	Region 2, OSWER/ Environmental Response Team, and ORD/NRMRL - Edison, NJ	Savings of $19,800/year; projected additional savings of $17,300/year, 920 million BTUs/year; projected additional savings of 800 million BTUs/year	Some

Item	Brief Description	Lab Name/ Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
24	Building automation system adjusted building temperatures in non-occupied areas	ORD/Atlantic Ecology Division (NHEERL) - Narragansett, RI	Annual average savings of $14,902*; annual average energy savings of 855 million BTUs (2.8%/year reduction)*	Some
25	Replaced an existing oversized boiler with two smaller 2.4 BTU boilers	Region 9 - Richmond, CA	Projecting this project to save in the range of 10%	Some
26	Replaced the existing 225-kilovolt ampere (kVA) uninterrupted power supply (UPS) with a new 80-KVA UPS	Region 9 - Richmond, CA	Reduction of 23% in kWh usage	Some

**These savings are averages based on annual data for FY99-FY06.*

Exhibit 9. Energy Use Reduction: Laboratory Improvements Planned, 2007-2010

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	Automatically reduced the building's temperature controls at night and on weekends	Region 4 Science & Ecosystem Support Division - Athens, GA	Ensures existing system capabilities are realized; savings of $30,000/year or 3,037 MMBTUs	Some
2	Adjust steam-reducing stations from 15 psi to 5-7 psi; operation will reduce boiler demand and load further	Region 3 AND OPP - Environmental Science Center, Fort Meade, MD	Ensures appropriate supply and exhaust to meet occupied and unoccupied periods and matching BAS with actual airflows. Payback of 1-2 years.	Some
3	Operational changes identified in recent energy use evaluations could enhance the efficiency of the HVAC system	Region 7 (RSTC) - Kansas City, KS	Ensures appropriate supply and exhaust to meet occupied and unoccupied periods and matching BAS with actual airflows. Paybacks 1-2 years.	Some
4	Replace 714-T12 bulbs (23%) within the next year	ORD/Ground Water & Ecosystems Restoration Division (NRMRL) - Ada, OK	Typical payback of 2 years; savings of $1,900/year (payback period approx. 10 years); approx. 31,000 kWh electricity/ year (approx. 1% total annual kWh consumption of lab)	All

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
5	Replace current hoods and laboratory ventilation systems that do not meet current safety or energy efficiency standards	Radiation & Indoor Environments National Laboratory - Las Vegas, NV	Replacement of these hoods offers the opportunity to achieve energy savings by reducing the amount of air that needs to be conditioned depending upon usage; no quantification of savings provided	Some
6	AWBERC Infrastructure Replacement Project-2008-014	ORD/Andrew W. Breidenbach Environmental Research Center (NRMRL) - Cincinnati, OH	Entails replacing infrastructure with state-of-the-art VAV and high performance fume hoods; 33,526 MMBTUs saved at completion; 134,104 MMBTUs in FY06	Some
7	Retrofit existing T12 lamps and magnetic ballasts; replace incandescent exit signs; and install motion sensors to shut off lights automatically	ORD/Ecosystems Research Division (NERL) - Athens, GA	Typical payback of 2 years; savings of $5,173/year	All
8	Recommend that fume hood be calibrated at 85 fpm (complying with EPA/OSHA requirements)	Region 6 - Houston, TX	Test repeatability, reliability, and stability of the controls/ actuators/valves prior to pursuing implementation; estimate $300/hood/year savings	All
9	Explore reducing exit velocity out of the facility main exhaust further and the possibility of reducing the number of EFs during periods of non-occupancy	Region 3 and OPP - Environmental Science Center, Fort Meade, MD	Changing exhaust stack velocities saves money and energy but must be done in conjunction with review of disbursement study or upgrade of control system to monitor current wind conditions; estimated savings of $8,000/year	Some
10	Installing some T-5 technology, and switching to low-mercury tubes to eliminate disposal costs	OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	No quantification of savings provided; T-5 Technology (HQ does not have much experience with T-5 yet)	Some
11	Identifying additional instrumentation and equipment to be shut off during non-working periods	Region 6 - Houston, TX	Estimate $60,000 savings assuming offices and labs occupied less than 50% of time and instruments actually in use 30% of time	All
12	O&M assessment for optimizing energy systems by FMSD/SFPB	OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory- Ann Arbor, MI	Savings provided, possible 1-2% further savings, i.e., $8,000-16,000/ year	Some

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
13	Five additional fume hoods/ ventilation systems will be replaced	Region 2, OSWER/ERT and ORD/NRMRL - Edison, NJ	Savings of $17,300/year and 800 million BTUs	Some
14	1,200 40-year-old lighting fixtures and 4,000 F40-T12 and F32-T8 lamps scheduled to be replaced with new high-efficiency "green" fixtures that have electronic ballasts	ORD/NERL/ Environmental Sciences Division - Las Vegas, NV	Projected total cost savings of $38,400 from 2004-2011; 119,200 kWh electricity/year	All

4.2 Efficient Purchasing/Strategic Sourcing of Equipment and Supplies

4.2.1 Introduction and Key Concepts

On May 20, 2005, the OMB introduced a new acquisition initiative called strategic sourcing.[16] By definition, strategic sourcing is a collaborative and structured process of critically analyzing an organization's spending and then making business decisions about how to acquire selected commodities and services more effectively and efficiently. The intention is to help federal agencies optimize performance, minimize price, and increase achievement of socio-economic acquisition goals, among other objectives. In developing strategic sourcing proposals, agencies are encouraged to adhere to the following strategic sourcing model:

Exhibit 10. OMB Seven Step Strategic Sourcing Model

Step	Title
1	Opportunity Analysis
2	Profile the Commodity
3	Detailed Spend Analysis
4	Detailed Market Analysis
5	Develop Commodity Acquisition Strategy
6	Implement Acquisition Strategy
7	Manage Performance

[16]Memorandum for Chief Acquisition Officers, Chief Financial Officers, and Chief Information Officers from Clay Johnson III, Deputy Director for Management, OMB; Subject: Implementing Strategic Sourcing (May 20, 2005) [http://www.whitehouse.gov/omb/procurement/comp_src/implementing_strategic_sourcing.pdf]

In response to OMB's initiative, EPA created a Strategic Sourcing Team, with representatives from the Office of the Chief Financial Officer, the Office of Environmental Information, and the Office of Administration and Resources Management. This team identified three potential commodities/services for strategic sourcing: 1) "green" office supplies, 2) recycling and disposal services for information technology equipment, and 3) laboratory supplies.

4.2.1.1 Background for EPA's Strategic Sourcing Effort for Laboratory Supplies

Formed in early 2006, the Laboratory Supplies Commodity Team was established to develop, implement and assist in the management of strategic sourcing for laboratory supplies. The Laboratory Supplies Commodity Team is led by a tri-Chair representing EPA's key laboratory organizations (defined as the Office of Research and Development, Program and Regional Laboratory organizations). The Team includes representation from the Office of Research and Development, the Office of Air and Radiation, the Office of Prevention, Pesticides, and Toxic Substances, the Office of Administration and Resources Management, the Office of Environmental Information, the Office of the Chief Financial Officer, the Office of Enforcement and Compliance Assurance, and the Regional Laboratories.

The Laboratory Supplies Commodity Team seeks to transform the traditional acquisition approach as it applies to selected laboratory supplies. This will entail a collaborative and structured process whereby acquisition decisions are made based upon improved business intelligence. Detailed analyses of recent spending patterns and market influences will provide the information necessary for the change. The results will be a more efficient and effective system that provides greater overall value of taxpayer dollars.

In forming the group's charter, the Laboratory Supplies Commodity Team identified the following goals:

- To reduce the total cost for selected laboratory supplies provided by suppliers with equivalent or better service;
- To improve the fulfillment of socio-economic goal(s) for the selected laboratory supplies;
- To broaden the skills of EPA acquisition and laboratory professionals in a manner that elevates their role as business managers; and
- To strengthen laboratory management commitment to the strategic sourcing process so that sustained benefits are derived from the program.

The primary responsibility of the Team is to develop, implement and assist in the management of strategic sourcing for selected laboratory supplies. The Laboratory Supplies Commodity Team reports to EPA's Strategic Sourcing Team, which is responsible for the overall planning, implementation and logistical actions associated with strategic sourcing throughout EPA. The Laboratory Supplies Commodity Team provides project status updates to EPA's Strategic Sourcing Team at regular intervals and involves them at the appropriate key decision points. The Strategic Sourcing Team, in turn, reports to the EPA Strategic Sourcing Council. The Council is comprised of the Chief Acquisition, Financial and Information Officers. The primary responsibilities of the Council include the overall decision-making regarding key strategic sourcing issues, monitoring the progress of the program, and providing direction within EPA.

During the spring of 2006, the Laboratory Supplies Commodity Team distributed a survey to all EPA laboratories to collect information on purchases during Fiscal Year 2005 for each commodity category typically purchased to support laboratory operations. For purposes of this exercise, the Team focused on "disposable" commodities. Exhibit 11 provides definitions for the surveyed laboratory commodities:

Exhibit 11. Definitions of Laboratory Commodities

Category	Definition
Glassware	Objects/containers/utensils made of glass used for sample preparation and analysis, including disposable glassware
Plasticware	Objects/containers/utensils made of plastic, flexible polymers, and fluoropolymers, including disposable plasticware
Sample Containers	Containers used to store environmental samples
Personal Protective Equipment	Equipment or articles used to provide protection to the employee during laboratory operations
Disposable and Consumable Items	Items that are disposed of immediately after use AND items that have a defined lifetime due to use and degradation. This category does NOT include disposable glassware and plasticware (see above categories)
Reagents and Media	Substances used in the preparation and analysis of environmental samples that are chemical or biological in origin
Standards (including PT Samples)	Substances (liquid, solid or gas) that have a quantitative value and are used to determine the concentration of an analyte or for the fortification of a sample use to assess quality control. The substances can be chemical or biological in origin
Solvents/Acids/ Bases	A liquid substance used in the sample preparation and analysis of environmental samples, study samples, etc., to dissolve the target analyte(s)
Gases	A gaseous substance generally used in the operation of an instrument
Other	Any items not covered in the established categories

Over 30 EPA laboratories responded to the team's request. Based upon the survey results, the Agency spends over $7 million each year on laboratory supplies (Exhibit 12), procuring these commodities from over 800 vendors.[17] Use of government purchase cards appears to be the preferred purchase method. Prices paid generally have ranged from GSA schedule rates to retail rates.

Exhibit 12. FY 2005 Spending on Laboratory Commodities

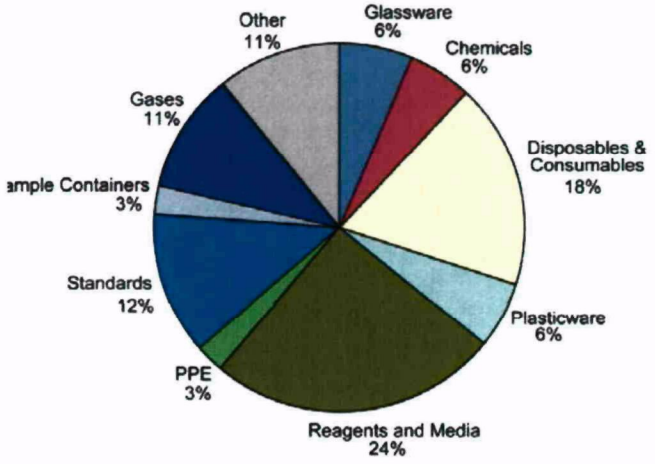
Laboratory Type	Total
Regional Laboratories	$2,297,915
ORD Laboratories	$4,250,468
Program Laboratories	$772,921
Agency Totals	$7,321,305

The team disaggregated the spending into finer categories. Exhibit 13 breaks the Agency's spending down by commodity category.

[17]All data on EPA laboratory supply purchases are derived from a 2005 EPA internal survey of its laboratories. A summary of these data can be found in the Request For Quotation (RFQ) — Laboratory Supplies Blanket Purchase Agreement (BPA) RFQ-OH-07-00111.

The vendor analysis identified two noteworthy conclusions: (1) suppliers of gases are unlikely to be able to supply the other commodities needed for laboratory operations; and (2) EPA laboratories procure most of their laboratory supplies from small businesses, several of which are positioned to supply materials across all of the Agency's laboratory supply categories.

Exhibit 13. Cost Distribution of EPA's Laboratory Commodity Purchases in FY 2005[18]



(Total dollar value of all purchases = $7,321,304.)

4.2.1.2 Implementation Status

The team believes that strategic sourcing will lead to general improvements relative to the current way of acquiring laboratory supplies. These improvements include cost savings, better socioeconomic opportunity, increased uniformity and quality in the acquisition of supplies, and improved resolution of disputes associated with the purchase of supplies. After much consideration of all acquisition options, the Laboratory Supplies Commodity Team recommended the solicitation be awarded as a Blanket Purchase Agreement (BPA). Some EPA laboratories have realized efficiencies in the procurement of laboratory supplies through similar vehicles. A BPA will provide an easier common method for (1) tracking of spending under the program, (2) providing spending data to the Agency's Office of Small Business, and (3) using government purchase cards to place orders.

Based upon this strategy, the Agency issued a Request for Quotation (RFQ) for this effort during the summer 2007. A pre-proposal conference with prospective vendors was held in August 2007, to allow potential vendors to ask questions prior to submitting their proposals. A cross-agency team, representing ORD, the regional laboratories, and the program laboratories served as the technical review panel. Two BPAs were awarded in March 2008 to Fox Scientific and Government Scientific Source.

The Agency awarded the BPAs as 100 percent small business set-asides. The BPA holders must have access to a variety of suppliers. They have agreed to meet stated deliverables and reporting requirements, including meeting quality specifications, timely delivery, and minimum performance standards. If supplies meeting a laboratory's specifications are not available via the BPA, laboratories may order these through alternate suppliers.

The team sees several potential advantages being realized as a result of the BPAs. Laboratories may realize a 10 to 20 percent savings on supplies purchased through the BPA when compared to the current acquisition process. In some cases, the discounts may be more significant. Laboratories should anticipate lower administrative costs and an improved ordering process.

As part of the implementation process, the Agency is conducting a pilot study with a cross-section of the laboratories. Through the pilot, the team anticipates identifying process improvements and streamlining of procedures. Full implementation of this program is anticipated to occur during the summer of 2008.

4.2.1.3 Performance Management

As the Laboratory Supplies Commodity Team moves forward with its procurement strategy, it will be important to keep different metrics in mind to monitor the Agency's performance and success in moving to a more streamlined approach to laboratory procurement. The team has identified the following performance measures based upon lessons learned at an individual laboratory level as well as other agencies that have already embarked on the strategic sourcing approach for procurement of laboratory supplies:

- To obtain participation of ≥ 90% of the Agency's laboratories within the Office of Research and Development, Program and Regional organizations in the first year of implementation;
- To source ≥ 20% of the total participating laboratories' supply cost in the first year of implementation;
- To reduce the annual total cost for selected laboratory supplies provided by suppliers at equivalent or better service; and
- To include socio-economic relevant businesses for the selected laboratory supplies.

4.2.2 Opportunities for Additional Strategic Sourcing Efforts

After successfully awarding the pending BPA for laboratory commodities, the Laboratory Supplies Commodity Team has expressed an interest in exploring a separate strategic purchasing plan for laboratory gases. A subgroup of the laboratory supplies commodity team has already formed to develop this proposal further. Work on this effort will continue through FY 2008.

A second opportunity to consider involves large laboratory equipment. Individual purchases of large laboratory equipment can easily exceed several hundred thousand dollars per piece of equipment. Other scientific agencies within the federal government have begun exploring strategic sourcing as a possibility for these pieces of equipment. Further discussion and benchmarking with these federal partners may be warranted to explore potential additional avoided costs for the laboratories.

4.3 Chemical Resource Management and Waste Reduction

4.3.1 Introduction and Key Concepts

EPA laboratories have developed, implemented and are planning a number of cost effective best practices to reduce chemical usage and waste at the source. Laboratory improvements in the areas of chemical and waste disposal management are generally more mature than in some of the energy areas, which have typically been more dependent on the development of new technologies or major upgrades to HVAC systems. By contrast, many of the potential savings in chemical resource management and waste reduction are possible with the adoption of best practices and little investment in new structures or systems. As a result, these savings, although frequently a small percentage of the overall operating budget of the laboratory, can be readily realized and may collectively have significant dollar value.

These observations are supported by a bar graph found in the Executive Summary (see Exhibit 1), which demonstrates that future planning for waste reduction activities is insignificant relative to other planned projects, whereas there are still a number of opportunities identified in the chemical management arena.

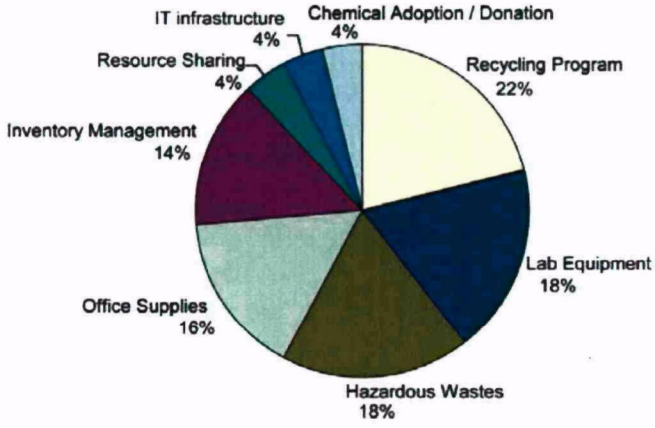
Improvements in chemical and waste disposal management have been incorporated as best management practices and good environmental stewardship, often implemented as part of Environmental Management Systems at many facilities. In response to E.O. 13423, the Agency added a specific target for its laboratories for 2007 through 2009. Hoping to minimize the use of toxic chemicals and hazardous substances, individual laboratories are required to set quantitative targets for at least three chemicals, from a list of 15, by the end of 2007.

The actions already taken or planned by EPA laboratories, which are spelled out in this report, show practical applications of how it may be possible for laboratories to come into compliance with Executive Order 13423, along with realizing potential cost savings. Implementation scenarios have included managerial review of current practices to identify new opportunities and eliminate outdated or less effective approaches (continuous improvement system approach). Planning and implementation strategies for chemical and waste disposal management must comply with all federal, state, and local regulations.

It is noteworthy that the practicality of different laboratories to implement chemical use and waste generation strategies as identified in this report is, in part, a function of the type of services that a laboratory provides. A large percentage of Regional laboratory analyses require the use of Agency standard methods. In many cases, these methods may specify or require either the use of larger volumes of chemicals and/or solvents or specify chemicals other than "green" chemicals, whereas ORD laboratories frequently have the option of specifying or developing methods that minimize the total volume of chemicals used and/or utilize "green" chemicals.

The different types of opportunities found in this section are depicted in Exhibit 14 at right.

Exhibit 14. Diversity of Chemical Resource Management and Waste Reduction Initiatives in Response to Location-Specific Cost Savings Questions



(Total number of chemical resource management and waste reduction initiatives = 78.)

4.3.2 Opportunities for Improvements in Chemical Resource Management and Waste Reduction

4.3.2.1 Solvent Recycling

In the area of solvent recycling, laboratories in Regions 3, 4, 8, and 9 have identified activities resulting in cost reductions of up to $15,000 annually. This reflects that cost savings are most apparent at facilities where large numbers of routine analyses are conducted. There may be additional Regional laboratories where this kind of cost savings can still be effectively implemented. ORD laboratories typically conduct research analyses that involve smaller numbers of samples, thus generating less volume of solvent.

Alternately, a disadvantage to solvent recycling can be potential reduction of solvent quality such that it is no longer usable for its original intended use. This is particularly true when the need for very high purity solvents for conducting ultra-low concentration analyses is required typically making ORD labs less amenable to solvent recycling programs. Additionally, depending on the system used, solvent recycling can be labor intensive unless an automated system is purchased. These are two significant factors to be taken into consideration when considering implementation of solvent recycling, and in one case a decision was made to not recycle solvents because of these concerns.

4.3.2.2 Chemical Treatment

Opportunities exist for chemical treatment of waste streams; however careful consideration must be made of the Resource Conservation and Recovery Act (RCRA) regulations concerning waste stream treatment. In particular, neutralization of waste is allowable only when directly part of the chemical measurement process.

Facilities in Region 4 and EPA's National Health & Environmental Effects Research Laboratory (NHEERL) Gulf Ecology Division have identified opportunities to remove and thus reduce waste streams for hazardous waste disposal through the process of neutralization. At Region 1, the costs of shipping of hazardous wastes has been reduced by identifying appropriate waste streams to be neutralized before being treated at an onsite wastewater treatment facility. At the Region 4 laboratory, significant savings have been realized (up to $1,500 annually) through neutralization of cyanide waste that would otherwise be sent for hazardous waste disposal. There is potential opportunity for increased savings throughout EPA, on a site-by-site basis, by identifying wastes that can be neutralized directly within the chemical measurement process, carefully screened, and then disposed to municipal or local waste treatment plants.

4.3.2.3 New Technology

It is anticipated that the development of new technologies will have the potential to reduce expenditures. Most of these new technologies have applicability in reduction of sample and reagent volumes needed for analysis, using alternate less toxic chemistries (e.g., "green" chemistry), installing onsite manufacture or centralization of needed instrument gases, and reuse of materials. EPA laboratories have already identified and implemented several such technologies with savings of up to $17,000 per year. For example, Region 10 installed a liquid nitrogen central distribution system that replaced several individual systems, reducing the need for space and labor in the refilling of the individual systems. EPA's National Exposure Research Laboratory (NERL, specifically the Microbiological and Chemical Exposure Assessment Research Division [MCEARD]) purchased gas generators for analytical equipment with an expected payback period of six months. Thereafter, the investment is anticipated to avoid annual costs of approximately $33,000, as well as additional labor and space costs.

4.3.2.4 Giving Away and Sharing Chemicals

Giving away and sharing chemicals is a means of cost savings that has been implemented widely across EPA laboratories and still has additional potential for implementation on a broad basis. This cost savings method applies both to chemicals inventory and chemical disposal. This method reduction is somewhat unique. It cuts across several aspects of environmental stewardship and scale and is the result of chemical management, chemical procurement, and chemical disposal for benefactors at the local scale, community scale and across federal agencies. The implementation of chemical inventory systems has made sharing of chemicals across laboratories in a single facility and across facilities possible. In some cases, it is the result of merging two chemical inventory systems to maximize sharing. The cost savings are a result of reducing the amount of new chemicals orders and ultimately in the reduction of disposal costs associated with hazardous waste streams. Many laboratories have become more proactive in locating chemicals identified by EPA laboratories or other federal facilities as being available for adoption. Chemicals retained beyond listed shelf-life have been tested against new material and verified as useable material, thus extending their time for use. There are many examples of these activities. Region 3 and OPP initiated a cooperative program with local high schools to distribute usable chemicals needed in the classroom. Region 9 was able to accept cases of dichloromethane from a United States Geological Survey (USGS) laboratory no longer having the need for this chemical. Costs savings range from moderate (a few hundreds of dollars per year) to significant (thousands of dollars per year). In one exceptional case, ORD saved over $50,000 in purchases when the National Pesticide Standards Repository (NPSR) provided over 600 pesticide standards for a large research project. This practice should be anticipated as having reduced impact over time, as overstocked chemical supplies diminish and chemical procurement procedures become highly efficient.

4.3.3 Conclusions and Key Recommendations

As stated earlier, the activities associated with savings in the area of chemical resource management and waste reduction are to a large extent already incorporated as part of EPA laboratory best management practices, largely in response to requirements related to Health and Safety policies and implementation of Environmental Management Systems. Nonetheless, collectively, significant opportunities still exist in the following areas:

- New technologies developed for microanalyses coupled with "green" chemistry
- Continued reductions in chemical purchasing and waste disposal through sharing of chemical stocks and continued development of recycling as part of best practices.

These efforts would benefit through consolidation of chemical inventory systems, improved means of cross-laboratory communications, and development of additional markets for recyclables.

4.3.4 Implemented and Planned Improvement Tables

Laboratory improvements identified in this survey all involved savings related to new technology developments. The use of gas generators probably represents an area with significant potential for additional savings.

Exhibit 15. Chemical Resource Management and Waste Reduction: Laboratory Improvements Implemented, 2004-2007

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	Solvent Recycling	Region 3, OPPTS - Fort Meade, MD; Region 4 - Athens, GA; Region 8-Golden, CO; Region 9 - Richmond, CA	Solvents recycled for reuse (methylene chloride; dichloromethane); Automated, still $2,000-15,000+/year savings	Some
2	Chemical Treatment	Regions 1 - Chelmsford, MA; Region 4 - Athens, GA; NHEERL (GED) - Gulf Breeze, FL	Use alternative treatments to neutralize (e.g., cyanide) hazardous wastes; use of onsite wastewater treatments; $1,500/year	Some
3	Environmental Friendly Material	OPP - St. Louis, MO; OAR - Montgomery, AL; OAR - Las Vegas, NV; OAR - Anne Arbor, MI; Region 3, OPPTS - Fort Meade, MD	Touchless towel dispensers; "green" office supplies; electronic forms and other record keeping (H&S); paperwork reduction practices; low Hg containing bulbs; reusable plastic/ceramic ware $1,000+/year	All (but cost savings are not clear and may not be significant)
4	New Technology	Regions 5 - Chicago, IL; Region 10 - Port Orchard, WA; OAR - Montgomery, AL; NERL (MCEARD) - Cincinnati, OH	No Hg sample prep/clean up; gas generators; redesigned liquid N system; implemented converters to reuse IT switches; Up to $17,000/year for gas generators	Some

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
5	Give away/ Share	Regions 3, OPPTS - Fort Meade, MD; Region 9 - Richmond, CA; NERL/ OAR-RTP - RTP, NC; OAR - Anne Arbor, MI; NHEERL (GED) - Gulf Breeze, FL; Region 2, OSWER - Edison, NJ	Chemical adoption program to distribute expiring but usable chemicals to local schools/ universities for reuse; share chemicals across co-located organizations; shared storage facilities $1,000-50,000/year	All/Some
6	Minimizing/ Miniaturization	Regions 1 - Chelmsford, MA; Region 3 - Fort Meade, MD; Region 4 - Athens, GA; Region 5 - Chicago, IL; OPP - St. Louis, MS; OAR - Anne Arbor, MI; NERL/OAR - RTP , NC	Chemical purchasing control procedure to reduce # chemicals on hand; chemical sharing for collocated organizations; purchase instrumentation requiring fewer solvents; reduce gas cylinder storage; Estimated >$250/yr	All
7	Recycling	Regions 3 - Fort Meade, MD; Region 4 - Athens, GA; Region 10 - Port Orchard, WA OAR - Anne Arbor, MI; Edison, NJ; NERL/OAR - RTP, NC	Recertify standards, verify concentrations, determine true expiration date <$1,000/year	Some
8	Maximizing/ Bulk	Regions 2 (OSWER/NRMRL) - Edison, NJ; Region 3 - Fort Meade, MD; Region 6 - Houston, TX; Region 7 - Kansas City, KS; Region 10 - Port Orchard, WA; OAR - Anne Arbor, MI NERL/OAR - RTP, NC	Purchase in bulk; improved storage cabinets; efficient distribution systems <$2,400/year	Some

Exhibit 16. Chemical Resource Management and Waste Reduction: Laboratory Improvements Planned for 2007-2010

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	New Technology	Region 10; NERL-MCEARD	Specialized distillation system $1,700/year Gas generators $38K/yr	Some

4.4 Water Conservation

4.4.1 Introduction and Key Concepts

Following the Agency's creation in 1970, one of the original environmental programs that formed EPA's structure and mission was the Water Program. Over the years, the Water Program has matured and evolved in its scope and focus. While management of water resources has always been an inherent part of the Agency's mission, the emphasis in this area has been acute as we find ourselves in the first decade of the 21st century. The increased interest in conservation of natural resources has been the result of at least two significant factors: population growth across the country, and the need within the federal government to lead by example to promote programs intended to benefit the nation as whole. In response to increased awareness and emphasis, shrinking budgets, and the issuance of executive orders concerning such issues, EPA has taken a proactive approach and implemented water management practices within its own facilities to conserve water, enhance efficiencies, and reduce costs. EPA laboratories, in particular, have always been conscientious about operational efficiencies and have been active participants in such efforts, both now and in the past. As a group, they have vigorously sought opportunities that result in cost-savings and efficiencies, specifically in the area of water conservation.

EPA has published the following charts (see Exhibits 17 and 18) depicting water consumption in a "typical" laboratory and in a

Exhibit 17. Typical Laboratory Water Use

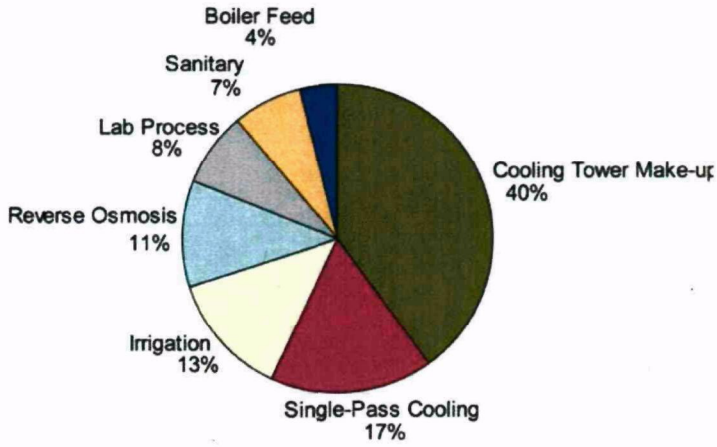
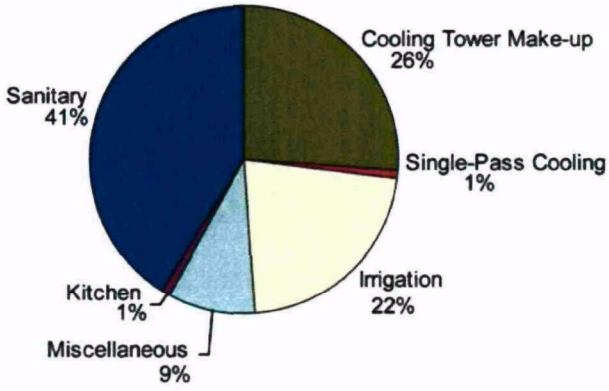


Exhibit 18. Typical Office Water Use



"typical" office building.[18] These charts provide an approximation of water consumption in these facilities, but it is important to note that these percentages vary depending on the operations carried out in individual facilities as well as other factors such as the type of HVAC system, age of facility and/or equipment, and laboratory processes.

Water use in Agency laboratories involves research activities that consist of performing analyses using wet chemistry and/or microbiology techniques, as well as carrying out research, testing and other developmental projects relating to aquatic life (e.g., macroinvertebrates and fish), groundwater, surface water (fresh, brackish and marine), wastewater, and drinking water. In addition to utilizing water for performing specific analyses and procedures, water use supports and/or meets daily laboratory operations including water treatments (e.g., reverse osmosis, deionization, and distillation), autoclaves, glassware washing, vacuum pumps, and chillers and facility operations including heating and cooling (heating, ventilation and air conditioning or HVAC systems), humidifying, and dehumidifying indoor air, sanitary use, and irrigation.

EPA's laboratories have made strides to reduce water consumption and they continue to seek opportunities to reduce water use even further. With water conservation continuing to be a priority, EPA set a goal of reducing total water use 15% by 2010 from an FY 2000 baseline. One major undertaking to achieve this goal has been the completion of comprehensive water management assessments of individual laboratory facilities. Based on these assessments, a water management plan was developed to establish long- and short-term goals for reducing water use. As of March 2007, plans have been developed for water management at 18 of EPA's laboratory facilities.

Additionally, EPA's Sustainable Facilities Practices Branch has developed a listing of the top 10 water management techniques that have proven helpful in managing water use at Agency facilities. The listing consists of the following:

- Single-pass cooling elimination
- Culture water re-use
- Reverse osmosis system operations control
- Landscape irrigation/Xeriscaping
- Air handler condensate recovery
- Sanitary fixtures replacement (faucet aerators, waterless urinals, high-efficiency toilets)
- Cooling tower optimization
- Autoclave water control
- Rooftop rainwater recovery
- Meter/measure/manage practices

In summary, the laboratories throughout the country are significant water users, but have, and are, actively seeking opportunities to conserve water from both a use and cost prospective. Unfortunately, the opportunities that would result in the most savings are also the most costly, because they require major refurbishing of

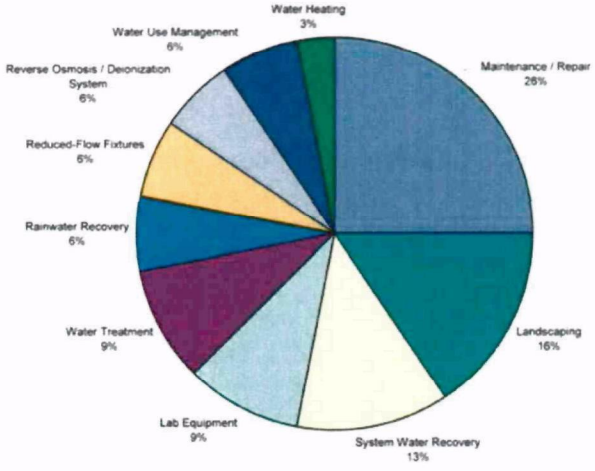
[18]Source: www.epa.gov website under the major topic heading of *Greening EPA*.

systems, especially HVAC systems. Out of necessity, many of these opportunities will have the implemented on a long-term basis.

4.4.2 Opportunities for Improvements in Water Conservation

A review of the input received from EPA laboratories across the country, as well as available data tracked and distributed by EPA headquarters, yielded various opportunities for improvement. Some of the more innovative approaches were low in terms of cost but have resulted, or will result, in water use reductions. Other approaches were more expensive, requiring major renovations and/or application of a few technologies, but had an even greater potential for water use reductions. Many of the approaches did not include accurately measured results, but all appeared to have resulted in noticeable reductions in water consumption at individual facilities.

Exhibit 19. Diversity of Water Conservation Initiatives in Response to Location-Specific Cost Savings Questions



(Total number of water conservation initiatives = 32.)

The majority of the water efficiency measures reported have already been implemented based on evaluation of the input from the laboratories. Opportunities are classified, for the purpose of discussion, into the following general categories: laboratory operations, facility operations, and management practices (note: it is not intended that these general categories be synonymous with the Categories, Parts of the Infrastructure or Focus of Project terminology contained in the data tables compiling all of the information submitted as part of this short-term study, but are merely used for discussing the improvements in major groupings). The laboratory operations category includes water treatment of laboratory water, health and safety equipment, and other laboratory-specific equipment (e.g., glassware washers, autoclaves, vacuum systems). The facilities operations category includes heating and cooling equipment, sanitary devices and irrigation. Water management practices include any efforts that implemented specific measures to control, monitor or reduce water usage.

4.4.2.1 Laboratory Operations

Under this category, the modification of the preventative maintenance schedule for safety showers and emergency eyewashes is one beneficial water conservation opportunity. This change not only reduces water use, but also reduces the time it takes to perform this maintenance, as well as the amount of wastewater discharged to the sanitary sewer. The practicality of this procedural modification is that it does not cost anything to implement. It is not intended to infer that the requirements for ensuring proper safety equipment operation should be lessened, only that the focus should be water efficiency and ensuring satisfactory reliability of these safety devices. Depending on the number of these devices in a laboratory, the savings in water consumption can be significant. The reduction in the frequency of the performance checks and the activation time (flushing) needed for each device to ensure proper operation reduces the amount of water used for these procedures.

Another improvement that has led to positive results is in the treatment of water for use throughout the laboratory. One laboratory reported replacing the distillation system with a reverse osmosis (RO) system that resulted in less water use. Another laboratory reported reducing the operation of the RO system from continuous 24/7 to 12 hours on/12 hours off, which also reduced water use. A third laboratory installed a recovery system for the rejection water from the RO system for reuse, eliminating wastewater discharge and providing supplemental water to a rainwater collection system.

4.4.2.2 Facility Operations

The largest water users in this category are the HVAC systems. There has been a variety of improvements implemented at various laboratories to reduce water use and improve water efficiencies. In some cases, these improvements have required significant capital improvements, such as replacement of cooling towers with more efficient ones, and changing treatment systems for the make-up water added to cooling towers to replace water lost through processes such as evaporation.

Another use with high water demand is landscape irrigation. Improvements in this area have included installation of water sensors for controlling the operation of automatic sprinkler systems and maximizing water conservation. Xeriscape landscaping concepts have been initiated at least four laboratories, which utilizes minimal or no maintenance vegetation to eliminate or reduce the need for watering and mowing.

4.4.2.3 Water Management Practices

It has been found that implementation of leak detection and prevention measures are beneficial not only from the standpoint of water conservation, but when considering the potential cost of damage, instrument repair or replacement and loss in productive time resulting from a leak. Since the Agency is self-insured, all costs resulting from incidents of broken pipes or fittings may be borne by the affected organization. In one specific instance, a faulty supply line to a deionizer resulted in water damage. The total cost of remediation for the damages was $27,277.23. While there is not a fail-safe system to prevent every potential instance of a leak, implementing a process of routinely checking for water leaks, installing leak detection or minimization measures, and/or replacing suspect piping prior to failure certainly has merit. The cost of repairing a pipe or fitting prior to catastrophic failure is much less expensive than repairing the resulting damage.

4.4.3 Conclusion and Key Recommendations

4.4.3.1 Application across EPA Laboratories

Based on the review of available data and the input provide by the various EPA laboratories, it is apparent that the facilities that have completed the process of developing and implementing water management plans have been the most successful overall in reducing water use. Based on the published summaries for FY 2006, 61% of the facilities that have developed formal water management plans showed a water use reduction from the previous five-year average (FY 2001 through FY 2005), whereas only about 38% of the remaining facilities (that had not developed a water management plan) showed a reduction in water use. The process consists of determining current water usage, processes and costs; identifying water processes, measurement devices, and other facility information; assessing emergency measures to meet minimum water needs; comparing Best Management Practices (BMPs) against current operations, processes and equipment; and developing a comprehensive plan to maximize water efficiency and/or minimize water use. The positive trend reflected by the data supports this effort and reveals that going through the process itself has been beneficial by enhancing awareness, highlighting areas

of potential improvement and implementing immediate water-saving procedures. Thus, in order to achieve the most benefit in striving to reach the ultimate water consumption reduction goals, it is highly recommended that an assessment of water management practices and development of a water management plan be accomplished at all of the remaining laboratories as soon as possible.

Another opportunity that would likely be a result of development of a water management plan is the implementation of management practices focusing on water conservation. It has been shown that changing and/or optimizing various processes and procedures results in reduced water use and increased water efficiency. Although there are a variety of systems in the laboratories, it would be helpful to establish a mechanism to share successes as well as failures concerning water conservation projects.

Metering of water usage is an area that should be included in the process leading to the development of a water-monitoring plan. Knowing where and how much water is used is essential to the assessment of water efficiencies and for measuring progress in reducing water use as projects are initiated and put into practice. This aspect of the assessments and water management plans should not be overlooked.

Although more in the area of facility operations, the installation of low flow devices is also an option worth considering across the laboratories. The resulting long-term water efficiency would likely offset initial investment costs. A cost-benefit analysis should be completed on each proposal when considering availability of funds.

4.4.3.2 Potential for Application to Laboratories after Additional Study

The consideration of opportunities for application at any facility will depend on a number of factors. These factors include, but may not be limited to, implementation costs, ease of implementation, projection of the amount of water use reduction, age of facility and associated equipment, climate, laboratory operations, projected payback period, and consideration of owned versus leased facilities. Consideration of all of these factors need to be made when looking at potential water conservation measures at any specific facility, because one opportunity may not be universally applicable to all laboratory facilities.

Recovery and reuse of various water streams need further evaluation. In many cases, discharge of water streams to sanitary sewer occurs because the laboratory does not have a viable use for the recovered water, or does not have a suitable means to store the water for reuse. A few examples provided from the laboratory input included recovery of condensate water from heating or cooling operations, and recovery of the rejection water from the reverse osmosis system. With further study, there may be other reuses of current waste streams.

4.4.3 Implemented and Planned Improvement Tables

Exhibit 20. Water Conservation: Laboratory Improvements Implemented, 2004-2007

Item	Brief Description	Lab Name/ Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	Reprogrammed autoclave so that water did not run through the system continuously, but only during use. Also, installed a water-saving valve in one of the autoclaves.	Region 10 Laboratory - Manchester, WA	Reduced the amount of water used. An estimate of $1,500 per year savings was provided. The actual amount of water use reduction was not reported.	Some
2	Replaced laboratory glassware washer	Ground Water & Ecosystems Restoration Division NRMRL/ ORD - Ada, OK	New washer requires 9.1 gallons of water versus 12.6 gallons of water per fill for the old washer. Reduced water consumption, energy usage (for heating the water with electrical heating elements), the amount of detergent used for cleaning glassware, and the amount of wastewater discharged to sanitary sewer. A reduction in water use of 12,600 gallons per year was reported.	Some
3	Added plastic washing tubs in the laboratory sinks for glassware and equipment cleaning	Environmental Chemistry Laboratory, OPP - Bay St Louis, MS	Reduced water usage for cleaning laboratory glassware and equipment. There was no estimate of water use reduction reported.	Some
4	Landscaping design includes native grasses, wildflowers and shrubs; maintenance program consists of no watering, no pesticides or fertilizers and only cutting grass once per year	Region 1, New England Regional Laboratory - Chelmsford, MA	Eliminates need for irrigation watering; reduces workers necessary for landscape maintenance; and reduces use of fuel for mowing. It is not possible to estimate savings.	Some
5.1	Installed a water moisture sensor to control the automatic lawn sprinkler system	Region 4 Science & Ecosystem Support Division Laboratory - Athens, GA	Reduced the amount of water used for lawn maintenance, but an estimate of savings was not possible.	Some
5.2	Disconnected constant water flow to the fish preparation laboratory	Region 4 Science & Ecosystem Support Division Laboratory - Athens, GA	Reduced the amount of water used since water is only turned on when needed. Quantification of water use reduction was not possible.	*
5.3	Repaired a water system leak that went undetected for over a year	Region 4 Science & Ecosystem Support Division Laboratory - Athens, GA	Reduced the amount of domestic water utilized	*

Item	Brief Description	Lab Name/ Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
6	Changed the frequency and volume of water for flushing the emergency eyewash stations in the lab	Region 10 Laboratory - Manchester, WA	Reduced the amount of water used	Some
7	Modified the preventative maintenance program for fire hydrants and fire suppression sprinkler systems by reducing the amount of time the systems are flushed on a regular basis.	Region 2, Environmental Response Team (ERT)/OSWER & NRMRL/ORD – Edison, NJ	Reduced the flushing time from 20 minutes for each hydrant and sprinkler system to just opening each up fully to ensure adequacy of flow and then immediately shutting it down. The entire water supply system is flushed from a single hydrant located at the back of the facility. The savings from the modification are approximately 500,000 gallons of water and $2,150/year.	Some
8	Fire suppression sprinkler system is built as a dry-pipe system	Region 7 Science & Technology Center - Kansas City, KS	Eliminated need for flushing the fire suppression system, resulting in no domestic water use unless system is activated	*
9	Modification of preventative maintenance procedure for laboratory safety showers and emergency eyewashes	Region 2 Laboratory, Environmental Response Team (ERT)/OSWER & NRMRL/ORD - Edison, NJ	Reduced the amount of time for flushing each fixture from five minutes weekly to one minute every two weeks; reduces the amount of water utilized for this process by about 50,000 gallons and a cost of about $220/year	Some
10	Modified preventative maintenance checks of the laboratory safety showers and emergency eyewashes	Region 7 Science & Technology Center - Kansas City, KS	Changed the procedure required from a five-minute flush of each emergency eyewash every week to approximately a minute monthly; changed the frequency of checks for safety showers from monthly to semi-annually; reduced the amount of water used and time and resources needed to perform the checks	Some
11	Replaced water distribution system	Region 2 Laboratory, Environmental Response Team (ERT)/OSWER & NRMRL/ORD - Edison, NJ	Eliminated several leaks in the system, reducing water use by an estimated 400,000 gallons and $1,700/ year	*
12	As a result of an event caused by the failure of two hot water lines, replaced pressure fittings with treaded fittings on hot water lines and performed preventative maintenance on 200 laboratory sinks	OARM - Research Triangle Park, NC	Eliminated potential catastrophic failures of hot water lines in 33 laboratory sinks that could have resulted in repair costs of up to $1.5 million due to the damages	Some

Item	Brief Description	Lab Name/ Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
13	Contractor uses reclaimed storm water for research and testing instead of domestic water	UWMB Laboratory - NRMRL/ORD Edison, NJ	Eliminated the need for using domestic water to simulate storm water on which to perform research and testing; eliminated the need to treat and add chemicals to domestic water to produce an accurate replacement for storm water; resulted in the savings of approximately 1,040,000 gallons/ year of domestic water and $4,500/year	*
14	Rainwater collection system was designed and built into new facility	Region 7 Science & Technology Center - Kansas City, KS	Roof drains collect runoff of rainwater that flows to a 10,000-gallon storage tank; rainwater is used for toilet flushing and for make-up of cooling tower water when available, reducing the amount of domestic water used	*
15	Replaced traditional manual flush toilets (30) and urinals (20) with low flow units equipped with motion sensitive flushing valves; and replaced traditional manual lavatory faucets (40) with low flow units and motion sensitive flow controllers	Environmental Sciences Division, NERL/ORD - Las Vegas, NV	Reduced water usage for sanitary purposes; reduction in water use is estimated to be 825,000 gallons per year	Some
16	Replacement of distilled water system with reverse osmosis (RO) deionized (DI) water system	Andrew W. Breidenbach Environmental Research Center (NRMRL)/ORD - Cincinnati, OH	Produced high quality water for laboratory use more efficiently; eliminates need for a boiler to produce DI water; reduction in domestic water use to produce DI water. The water use reduction was significant: from 8 gallons of city water to generate 1 gallon of distilled water to 1:1.	Some
17	Reduced operations of the reverse osmosis system from 24/7 to 12 on/12 off during workdays	EPA Environmental Science Center – Region 3 & OPP Laboratories - Fort Meade, MD	Reduced water usage by 500,000-750,000 gallons/year	Some
18	Recover condensate water from building air-handling units (AHUs)	Region 7 Science & Technology Center - Kansas City, KS	Recovered water is collected and pumped into the rainwater collection system, resulting in reduction of domestic water needed for toilet flushing; Approximately 600,000 gallons of water are recovered per year	Some
19	Recover reject water from reverse osmosis system that was being discharged to the sanitary system	Region 7 Science & Technology Center - Kansas City, KS	Recovered water is collected and pumped into the rainwater collection system, resulting in reduction of domestic water needed for toilet flushing; approximately 150,000 gallons of water are recovered per year	Some

Item	Brief Description	Lab Name/ Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
20	Improved water treatment program	Region 10 Laboratory - Manchester, WA	Increased efficiency of thermal transference and extending operational life of all water-related mechanical systems	Some
21	Instituted procedure of continuing to utilize disposable water purification cartridges beyond their expiration date as long as the quality of the purified water remained within manufacturer's specifications	Region 10 Laboratory - Manchester, WA	Estimated cost savings of $2,450/year	Some
22	Installed dry chemical feed to water treatment systems for boilers and chillers	EPA Environmental Science Center, Region 3 & OPP Laboratories - Fort Meade, MD	Reduced amount of water used; reduces backflushing by allowing tighter water quality conditions; allows for the introduction of biocides to reduce the potential for Legionella type material in the systems	Some

** Special situation or limited application*

Exhibit 21. Water Conservation: Laboratory Improvements Planned, 2007-2010

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	Incorporating Xeriscape landscaping into the new Secure Emergency Response Asset Building	Radiation & Indoor Environments National Laboratory - Las Vegas, NV	Minimizes or eliminates need to water vegetation	Some
2.1	Install a rain/freeze sensor and/ or soil moisture indicator on the current 8-zoned lawn sprinkler system	Region 6 Laboratory - Houston, TX	Improves the efficiency of water used for landscape irrigation	Some
2.2	Work with building lessor to develop additional Xeriscape concepts that could be implemented through the base lease agreement	Region 6 Laboratory - Houston, TX	Minimizes the amount of water needed for landscape irrigation	Some
3	Monitor and control watering system with greater efficiency; system is about 17 years old	Region 6 Laboratory - Houston, TX	Could include installation of new zone controllers and monitoring systems/sensors to enhance efficiency of system and reduce water use	Some
4	Installation of pressure regulators and gauges on all deionized water supply lines	OARM - Research Triangle Park NC	Minimizes or eliminates incidents of water damage due to faulty or leaking water supply lines; potential cost savings of about $245,000 by avoiding water damage remediation due to failed water supply lines.	Some
5	Installation of low-flow water fixtures and faucets throughout the facilities	Andrew W. Breidenbach Environmental Research Center, NRMRL/ORD - Cincinnati, OH	Reduces the amount of domestic water used for sanitary use	Some
6	Recovery and reuse of condensate water	Region 3 and OPP – Environmental Science Center Fort Meade, MD	Source of water is from steam for heating in cold weather and air handing units in hot weather. Barriers to implementation include uncertainty of water quality; potential use of the recovered water; inconsistent and periodic nature of condensate discharge; and the cost of changing plumbing to facilitate the recovery and reuse of (i.e., cost effectiveness).	Some

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
7	Reuse of reverse osmosis system rejection water.	Region 3 and OPP – Environmental Science Center Fort Meade, MD	Source of water (potentially 1,300 gallons per day) is from the water treatment system to provide deionized water for laboratory use. Barriers to implementation include potential use of recovered water; lack of suitable storage capacity; and cost of necessary plumbing changes.	Some
8	Replace hot water heaters with gas tankless water heaters	Region 4 Science & Ecosystem Support Division Athens, GA	Hot water is generated via two systems: 40-gallon gas hot water heater for two rest rooms and a break room; and three 77-gallon boilers for two rest rooms with showers and 36 laboratories. Barriers to implementation include potential restrictions due to lease; verification of potential installation costs and resulting cost savings (estimated to be 50%); and need for a more detailed engineering evaluation.	Some
9	Complete a comprehensive water use study of the facility	Region 7 Science and Technology Center - Kansas City, KS	Evaluate trends in water usage, verify water needs, confirm plumbing and discharges, detect potential vulnerabilities, and identify potential water use projects for consideration. Utilize results to develop comprehensive water management plan. Barriers to implementation include cost and expertise needed to complete the process.	All
10	Implement a water management plan that consists of replacing the existing autoclave, upgrading sanitary fixtures, installing an air handler condensate recovery system, and using an on-site well for irrigation and cooling tower makeup water	Ecosystems Research Division, NERL/ORD - Athens, GA	Upon completion, will result in an estimated savings of approximately 900,000 gallons in municipal potable water use per year	Some

**Special situation or limited application*

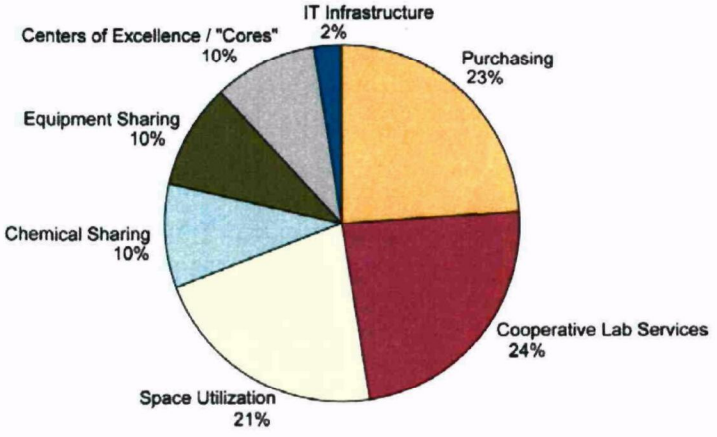
4.5 Resource Sharing

4.5.1 Introduction and Key Concepts

Regulatory, applied, and research sciences at EPA are performed in research and development, regional, and program office laboratories located across the continental U.S. Some are co-located with universities and colleges, some with state environmental organizations, and some with other federal agencies. EPA scientists and technicians at these laboratories have a broad range of expertise and provide wide-ranging services to diverse audiences within EPA and outside of the Agency. Over the years, the laboratories have worked somewhat collaboratively within these three distinct groups. EPA is now at a juncture where it makes sense to look holistically across the laboratories to identify opportunities to improve their efficiency and effectiveness and to form a comprehensive laboratory network/system that provides a framework to share ideas and actions that may lead to improved efficiency, reduced energy consumption, and related cost savings.

An integrated laboratory network/system will enable EPA to produce quality science, maintain a sound infrastructure, and attract and retain scientists and technicians. An effective and efficient lab needs to have high quality facilities, equipment, instrumentation, and supplies as well as high-performance computing and telecommunications resources and a responsive procurement and budgeting system. Additionally, an effective and efficient laboratory must have adequate expertise and scientific procedures and protocols in place.

Exhibit 22. Diversity of Resource Sharing Initiatives in Response to Location-Specific Cost Savings Questions



(Total number of resource sharing initiatives = 42.)

This chapter explores the concept of "resource sharing" among the laboratories. Suggestions by EPA employees identified a number of ideas for resource sharing. Appendix 6 groups these suggestions into areas called "Focus of Project," which are listed as follows:

- Purchasing
- Cooperative Lab Services
- Space Utilization

- Chemical Sharing
- Equipment Sharing Centers of Excellence
- Information Technology Infrastructure

Across the laboratories that responded to the data call and for the activities characterized under "resource sharing," purchasing, cooperative lab services, space utilization, and equipment sharing appear to have the most applicability across EPA for potential efficiencies and cost savings. Very few of the examples appeared to have rigorous cost saving analyses conducted; most will need additional analysis to understand the costs and benefits and to determine the feasibility for future application.

4.5.2 Opportunities for Improvements in Resource Sharing

4.5.2.1 Purchasing Efficiencies

The laboratories have identified several different kinds of purchasing efficiencies. These include agreements with other organizations for analytical services; the use of EPA contracts expertise to ensure that equipment purchases are fully integrated; the establishment of IAGs with other federal organizations to utilize excess space at their facilities; and the pursuit of capital equipment acquisition partnerships among various EPA laboratories and divisions. Below are examples of implemented purchasing efficiencies. Other examples can be found in Appendix 6.0.

Two examples of implemented purchasing efficiencies are equipment contracts and cross-departmental partnerships. Fully integrated equipment contracts saved $1 million in the OAR's National Vehicle and Fuel Emissions Laboratory (NVFEL) Certification Test Sites Modernization Program. Partnering with OARM's Cincinnati Contracts Division resulted in creative use of thorough performance specifications, requiring that equipment providers also ensure integration with all existing test-site safety, facility, and operational systems. Due to intense competition to win these contracts, some bidders performed all of this integration work at no cost to the government. Coupled with clear incentives and disincentives, these contracts came in on time and below cost.

The pursuit of cross-laboratory and -division partnerships for capital equipment acquisitions has also proven to be beneficial. Recent examples of such activity include the purchase of: (1) a deoxyribonucleic acid (DNA) analyzer in 2005 for approximately $325,000 that is used by NERL/MCEARD and the NRMRL/Water Supply and Water Resources Division (WSWRD); and (2) a real-time Polymerase Chain Reaction (PCR) Thermocycler purchased in 2006 for approximately $90,000 that is used by NERL/MCEARD, NRMRL/WSWRD, and the Office of Water's Technical Support Center (OW/TSC). This approach to leveraging acquisition of large ticket items promotes partnerships to facilitate capital equipment purchases that demonstrate benefit to multiple organizations.

Additional opportunities for improvements related to purchasing efficiencies can be found in both 4.2 *Efficient Purchasing/Strategic Sourcing of Equipment and Supplies* as well as Appendix 6.0 of this report. Comprehensive understanding of laboratory activities and improved communication throughout the laboratory network could greatly enhance purchasing efficiencies.

4.5.2.2 Cooperative Lab Services

Regional, ORD, and programmatic laboratories often team together to accomplish work when a lab is unable to fulfill a request for services without the help of another. The following examples illustrate this notion. The Regional laboratory network has a long history of providing assistance if a Regional laboratory is unable to accommodate a request within their region due to either limited capacity or capability. In another example, a Regional lab and ORD collaborated on a water project that allowed for sharing a laboratory function without having to establish duplicate procedures; while in another case ORD and a program lab signed a memorandum of understanding (MOU) where the program lab would serve as a reference lab in support of ORD research.

There are several examples of successfully implemented cooperative lab services. NERL-RTP has many instances where working with other co-located laboratories has resulted in cost savings. An example is apportionment work done with NRMRL. NERL had an instrument that NRMRL needed and NRMRL had the standards that NERL needed; the two laboratories came together to perform the organic speciation work and shared what they had. They also shared the cost of a student. The estimated savings was $20,000.

A cooperative arrangement between the Region 6 laboratory and the local Texas Council on Environmental Quality (TCEQ) laboratory has been set up to perform certain wet chemistry testing for the Houston lab in exchange for testing equipment. Prior to 1990, the Region 6 laboratory and the Texas (now

TCEQ) environmental laboratory resided in the same facility. This arrangement allowed the TCEQ laboratory to perform all classical wet chemistry parameters for the Region 6 EPA laboratory. In 1990, even though the Region 6 laboratory and the TCEQ laboratory had both moved into their own separate facilities, the relationship was worth continuing through a revocable license agreement and the use of a hotshot delivery service to ship samples across town. Estimated savings are $192,400 per year to $142,600 in annual salary for two GS-12 chemists; $28,500 in annual overhead costs for two full-time equivalent (FTE) workers; $14,100 in annual lease cost for lab and office space; and $7,200 in annual utility costs.

It is possible that other opportunities exist for efficiency improvements in resource sharing through cooperative lab services. The Agency needs to have a comprehensive understanding of the personnel and physical assets across all the laboratories in order to identify areas for efficiency improvements.

4.5.2.3 Equipment Sharing

Several laboratories have implemented principles of centralized and shared resources to achieve efficiencies allowing for more optimized utilization of laboratory equipment and space with reduced investment costs. Two examples of equipment sharing are as follows:

The Region 2 Laboratory has a main area dedicated to the washing of laboratory glassware that is shared by the contractor laboratory that supports the Environmental Response Team (ERT). This shared service allows for the savings of staff, equipment, and space that would be required for a separate glassware washing area. The washer, including the water treatment system and dryer, cost approximately $50,000 and annual operation costs are approximately $2,500 for maintenance, and $50,000 for the personnel. This sharing arrangement permits optimal use of the equipment, space, and staff for both laboratories.

The Pacific Coastal Ecology Branch of the division worked collaboratively with National Oceanic & Atmospheric Administration (NOAA) in the Environmental Monitoring and Assessment Program (EMAP) coastal assessment of the west coast utilizing NOAA's ship, the McArthur II. At a cost of $20,000 per day, EPA would have had to pay nearly $250,000 for ship time had there been no collaboration with NOAA.

While the expectation would be that each individual lab would have a solid inventory of equipment, it is unlikely that there is extensive sharing of inventory information across laboratories due to the lack of a comprehensive EPA laboratory network/system.

4.5.2.4 Space Utilization

There are many examples of effective space utilization and space sharing. However, there appear to be institutional barriers that make sharing or joint occupancy difficult, particularly if the proposed utilization involves more than just EPA. This is also a sensitive area to explore given laboratory autonomy issues and the sensitivity surrounding lab consolidation.

4.5.2.5 Centers of Excellence (COE)/Cores

Among the regional laboratories, the concept of centers of applied science or centers of excellence had significance a few years ago. Though less prevalent today, this concept is relevant for highly specialized analyses that involve expensive instrumentation and highly trained personnel. An example of a center of excellence/core is the NHEERL Toxicogenomics Core (NTC). Though less prevalent today, this concept is relevant for highly specialized analyses that involve expensive instrumentation and reagents and highly trained personnel. There is an opportunity to centralize microarray resources within all of EPA. The NHEERL Toxicogenomics Core (NTC) and a smaller microarray core laboratory in NERL both process samples. Consolidating the two core laboratories could save in reagents and costs of equipment maintenance. There would also be additional cost savings if only one lab were to purchase upgrades to the standard equipment. Estimated savings that would result from the consolidation are approximately $10,000 per year in reagents and $30,000 per year in equipment maintenance agreements.

In order to better explore this concept, it would be important to do an in-depth inventory of activities and assets across all EPA laboratories.

4.5.2.6 Chemical Sharing

There was some evidence of chemical sharing from the data received from laboratories. This seems an area for further study, especially for those biological/chemical/processing agents that are extremely expensive and/or have a limited shelf life. Two examples of efficiencies for chemical sharing are collective bargaining and collective purchasing of reagents.

Six of the ten regional laboratories use Promium. Collective bargaining with the vendor, although not yet proposed, could result in significant savings to the Agency.

Prior to the NTC, each health division was purchasing their own reagents for gene expression analysis. In many cases, the investigators could not qualify for discounted bulk orders and/or the reagents were not used before their expiration date. The NTC now is the sole entity (for at least the health divisions) purchasing reagents. This allows better control over the use of the reagents by minimizing or eliminating waste, and allows the NTC to take advantage of cost savings through bulk purchases. Estimated savings are $30,000 per year.

4.5.3 Conclusion and Key Recommendations

Laboratories across the Agency have implemented, or plan to implement, improvements that increase their efficiency. Of those opportunities identified in resource sharing, the improvements in purchasing efficiencies, cooperative lab services, and equipment sharing appear to be the most applicable across the Agency laboratories. However, the data suggest that many EPA laboratories operate independently, or only within the regional laboratory network or ORD network. The Agency needs to have a comprehensive understanding of personnel and physical assets across all of its laboratories. A follow-up to this study would be a comprehensive study that looks at ways to enhance resource sharing through bulk purchasing, co-location, and specialized equipment sharing and purchasing as well as ways to share the broad range of technical expertise available within EPA.

4.5.4 Implemented and Planned Improvement Tables

Exhibit 23. Resource Sharing: Planned and Implemented Laboratory Improvements, 2004-2007

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	Purchasing	Regional, Programmatic, and ORD Laboratories	Across all lab types there are universal purchasing/ sharing arrangements for operations and management, analytical expertise, and equipment	All
2	Cooperative Lab Services	Regional and ORD Laboratories	IAGs/MOUs with States, Universities, etc.	All
3	Equipment Sharing	ORD and Programmatic Laboratories	Sharing of specialized laboratory equipment	All
4	Space Utilization	Regional Laboratories	Sharing of space across programmatic areas within regional laboratories	All
5	Centers of Excellence/Cores	Regional and ORD Laboratories	Allows for purchase of fewer instruments, maintenance agreements and reagents for highly specialized analyses	Some
6	Chemical Sharing	Regional and ORD Laboratories	Allows for bulk purchase of specialized chemicals or chemicals with limited shelf life	Some

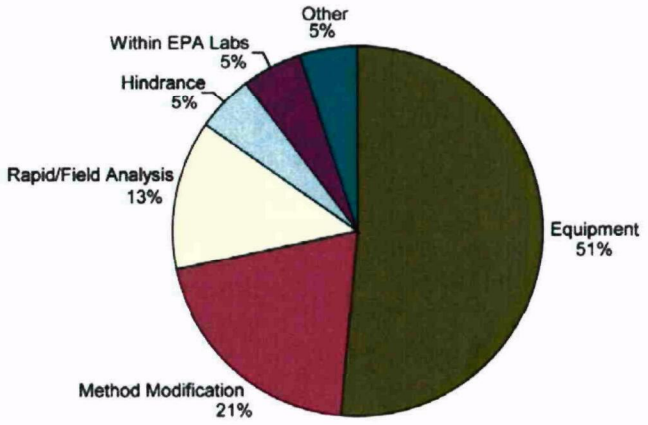
4.6 Efficient Analytical Procedures

4.6.1 Introduction and Key Concepts

Analytical procedures form the heart of the functions performed within EPA laboratories. They range from research and development procedures that attempt to establish new discovery and measurement tools for emerging contaminants; to well-documented traditional procedures that are used to describe the physical, chemical and biological conditions of the environment. Without these procedures, there would be limited options to examine and judge the condition of air, soil, and water.

A considerable amount of resources such as supplies, instrumentation, space, energy, and labor are used to perform these procedures. Individual laboratories have explored and adopted many ways to increase efficiency and save resources over the last several years. Some were unique to a facility, while some had application at several laboratories.

Exhibit 24. Diversity of Analytical Procedure Initiatives in Response to Location-Specific Cost Savings Questions



(Total number of analytical procedure initiatives = 39.)

Improving efficiency spans three areas of application: equipment, method modification, and the use of rapid or field analytical procedures. Other associated actions include the use of current EPA and contractor staff instead of commercial laboratories, which may result in the reduction of costs. The highest cost savings are realized when contractors operate in government-owned laboratories.

Some important considerations to note when considering efficiency in analytical procedures are the number of samples processed in a given time and the cost of new equipment. Often, updating equipment can improve efficiencies and reduce costs. This should be a consideration when evaluating overall savings. Additionally, Environmental Management System (EMS) requirements should be a consideration regarding energy and chemical waste streams before purchasing new equipment. It is worth noting that if a procedure saves time, then a lab has the ability to increase its capacity.

The use of field or rapid screening procedures may also improve efficiency. At times, methods and equipment that provide data of appropriate quality reduce the number of samples that need analytical determination in a lab. The caveat is that the equipment and procedures must be demonstrated to be of high-enough quality to ensure accurate decision-making."

The following discussion shows the more significant areas that are either being implemented or could be implemented to help reduce costs and operate more efficiently. All of the data were collected from a survey of EPA labs. In many cases, before increased efficiency can be realized, an initial expenditure is necessary. Some actions have a direct cost saving for supplies, while others save time, thereby accomplishing more with the same number of scientists. Additionally, some actions are more universally applicable than others.

4.6.2 Opportunities for Improvement in Analytical Procedures

4.6.2.1 Equipment-Related Efficiencies

Several labs described examples of advanced instrumental design, which helped automate and increase analytical throughput. As with any innovative technology, a management or engineering review should be considered to assure that expenditures for new equipment would result in tangible efficiencies or environmental benefits. Described below are examples of efficiencies related to advanced instrumental design.

A device is being used to heat liquid samples and reagents to digest samples and make metals available for analysis, saving reagents and reducing waste generation and preparation time. This "hot block" or similar equipment saves about $0.40 to $1.14 per sample, eliminates the need for a $2,500 water bath, and reduces waste volume by 50%. A 40 to 75% reduction in reagents is also achieved. Analysis time is saved by leaving the samples unattended during the digestion period. The initial cost of the equipment may be $3,000 to $4,000.

Extraction of water samples using liquid-liquid extractors (LLEs) is long, tedious, and can use large amounts of solvent. A modification of this is a micro-scale extraction, which reduces sample volume, saving significant transportation, analytical, and disposal costs. In addition, depending on the application, a reasonable substitute is Solid Phase Extraction (SPE). This technique uses various types of solid material that trap compounds of interest from the water matrix, by filtering the sample through the material and then eluting with a small amount of solvent or solvent mixtures. This technique can be conducted manually or with an automated system, reducing time for extraction, solvent usage, clean-up procedures, and contamination of the sample. Laboratories see a reduction in solvent use and thus waste volume of 75% using manual SPE cartridges and 50% with an automated system. The estimated cost per water sample is $5.51. Use of SPE resulted in avoided costs of $2,891 in one year at a Superfund site. Although these avoided costs may seem small when compared to the overall costs associated with a Superfund site, the avoided costs are real and have the potential to increase with widespread implementation.

The accelerated one-step (AOS) continuous liquid-liquid extractor system cuts the time used to set up and extract water samples for organic compounds by 33%. The reduction of the actual time needed for extraction is 66%. In addition, there is an 80% savings in the volume of solvent usage as compared to the traditional method. This in turn reduces the cost of waste disposal. The estimated savings is $8,000 per year and there is an increased capacity for efficiency in lab operations.

Solid samples have traditionally been extracted using Soxhlet glassware, large volumes of solvents, and long extraction times of at least sixteen hours. Laboratories began to use the automated solvent extraction (ASE) system to perform the comparable and usually more efficient extraction in about 30 minutes per sample. The solvent and waste reduction is 50%, which amounts to saving $7.34 per sample.

Extraction of solid samples for organic analysis can be conducted using an automated Soxhlet extraction device called Soxtherm. This system can extract 16 samples in 4 hours, saving 75% in time over traditional methods. Solvents are reduced by 50% which also represents a waste disposal saving. The estimated saving is $5,000 per year based on the number of samples processed.

At times less is more, as was found using a Midi-distillation of water samples for determining cyanides. The resultant savings using this equipment instead of the traditional large-scale glassware is 90% reduction in sample volume, waste, and reagent usage.

4.6.2.2 Method Modification

Both Agency method developers as well as method users should examine methods with respect to decreased chemical usage and waste. Based on the data quality objectives required, changes in procedures or equipment could also improve turn-around times and

increase lab capacity. Of course, the analyst must be able to demonstrate that the changes do not result in incorrect identification or quantification of the target analytes.

Procedural changes in gas chromatography (GC) reduced the time of analysis for pesticides and semi-volatile organic compounds. Analysis time was reduced 66% using high-efficiency analytical GC columns, from 30 to 10 minutes, while increasing the number of target compounds analyzed during the same time by 40%. The total result is an increase in analytical throughput.

Radiological determinations using improved equipment and techniques increased sample throughput. An automated coaxial P-type HPGe (High Purity Germanium) detector system increased the number of gamma isotope analysis of air filters by 30%. Gross alpha/beta counting on air filters increased 50% using a four detector proportional counting system. Another P-type HPGE detector with shield rapidly measures Plutonium on air filters and smears. Twelve single sample liquid scintillation counters increased capacity by 400%. The result of all of this is increased lab capacity without an increase in personnel.

Changing to Eichrom-based methods for analyzing soil samples and extracting Plutonium, Thorium and Uranium from other metals present in the soil saved time over the timed input/output automata (TIOA) method by 60%. In addition, there was reduction in acid consumption, as well as elimination of mixed waste for disposal.

Two emerging methods have the potential to save equipment and supply costs, while increasing efficiency through reduced sample analysis time and waste disposal. The first uses quantitative Polymerase Chain Reaction (qPCR) as a replacement for conventional microbiological methods. The estimated avoided costs using this method will be 50% in process costs per sample and may save $90,000 per year. Over the lifetime of the instruments, total avoided costs would be an estimated $1.3 million.

The second method, currently under development, entails the automated analysis of organic compounds in aqueous samples using solid phase extraction (SPE) coupled in-line with a large volume injection GC/mass spectrometer (GC/MS). It is expected that this method will provide significant cost savings in labor, chemicals, instrument purchases, and operations compared with current methods.

4.6.2.3 Rapid/Field Analytical Procedures

Field screening and rapid methods are useful ways to obtain the data needed to make decisions on-site. They can minimize the need for more definitive and often more costly lab methods. Lab supplies and equipment time are saved, allowing the lab to analyze more complex samples. Of course, these methods can only be used to achieve specific data quality objectives appropriate to the decision-making at hand. The following are examples.

X-Ray fluorescence (XRF), hand held mercury analyzers, and field portable GC/MS systems could minimize some lab analysis if samples are determined to be below an action level. Fewer samples would be sent to a fixed lab and field mobilization time may be shortened, saving time and money.

A rapid air method using Tedlar bags for volatile organic compound (VOC) solvents—used with GC/MS in a mobile lab on-site, in place of the Summa canister collection and analysis system—would take less time and be less expensive. However, only certain compounds at appropriate concentration levels would be candidates for this method. Data is generated close to real time with an estimated savings of $240 per sample, in addition to getting data to decision-makers faster.

Radiological methods such as Rapid Alpha Spectroscopy and Rapid Taping reduce the amount of reagents and labor needed to prepare the samples, as well as waste disposal costs.

Radiation testing of large areas using a newly developed ScannerVan, in-situ systems and other analytical tools relieve the need for sending teams out to collect and bring samples to a fixed lab. These tools have shown large savings over conventional lab analyses.

4.6.2.4 Working within EPA Laboratories

Data users should consult with their in-house laboratories before seeking external labs to address their analytical needs. There is an economy of scale in using existing lab capacity to perform analyses, which efficiently uses time and instruments. This may result in overall savings to the Agency.

A second validation of the method for analysis of perchlorates conducted in-house uses liquid chromatography coupled with mass spectrometry (LC/MS/MS), saving about $130,000 in labor costs.

Providing instrumentation to existing EPA and/or contractor personnel instead of using a commercial lab will reduce the turnaround time for the GC/MS analysis of air samples using Summa canisters. With enhanced automated systems for the instrument, data generation will be reduced from 10 days for the commercial lab to five days, thus increasing lab capacity.

There may be conditions that hinder the ability of a lab to modify methods or use new technology for more efficient user data delivery. An analysis of the data user's needs may suggest that a performance-based measurement approach would be more suitable to improve the outcome of the project and improve the efficiency of lab operations.

Regulatory methods for some analyses—such as polychlorinated biphenyls (PCBs), using Soxhlet extractors for wipes and solids, and use of continuous liquid/liquid extractors for water in the TSCA program—is costly in both time and material. ASE and SPE extraction procedures, accepted for analysis in other program areas, save time and reduce the amount of solvent and waste disposal. Providing ways to use advanced processes would help increase efficiency in lab operations and reduce costs. This could be achieved by removing regulatory barriers to allow use of more efficient and effective methods to generate data (e.g., employ performance-based measurements).

Investigation of new methods to prepare heavily contaminated water samples for analysis using automated devices would increase the ability to do more samples in less time. The need to use traditional methods increases costs. The Agency should investigate new instrumentation that may be on the market to overcome this obstacle.

4.6.3 Conclusions and Key Recommendations

Several of the initiatives mentioned have good potential applicability across various EPA labs. They include:

Upgrades of equipment to either increase efficiency of analyses, reduce materials required to accomplish analytical goals, reduce amounts and/or toxicity of waste products, and reduce personnel requirements.

Development or adoption of more acceptable analytical procedures given environmental and time constraints within scientific disciplines, inclusive of validation and production of new techniques and standard operating procedures.

Use of field instrumentation and survey equipment to reduce numbers of samples sent for laboratory analysis.

Some actions may have potential application to laboratories after additional study. They include:

Use of EPA personnel and/or on-site contract personnel to provide analytical support for projects that currently use external sources can provide financial savings and more fully utilize equipment already owned by the Agency. Additionally, this can provide an opportunity to reduce turnaround time for data and more intimately control quality assurance.

Development of procedures to evaluate new processes, procedures, and instrumentation in order to provide a readily accessible forum for Agency-wide use; this process could evolve into an easily utilized product that offers the laboratories environmentally and fiscally responsible analytical options.

4.6.4 Implemented and Planned Improvement Tables

Exhibit 25. Efficient Analytical Procedures: Laboratory Improvements Implemented, 2004-2007

Item	Brief Description	Lab Name/ Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	Metals hot block/mod block digester	Regions 2, 7, 10	$0.40 – 1.14/sample; 40-75% reagents; 50% waste disposal	All
2	Solid phase water-extraction	Regions 7, 8	50 – 75% solvent & waste; $5.51/ sample	All
3	Accelerated one step water extraction	Region 2, 10, ORD & OSWER – Edison, NJ	$8,000/year; 66% time saved for extraction; 80% solvent	All
4	Automated solvent extraction (pressurized) for solids	Region 7, NRML, Ada, OK	95% time saving; 90% solvent & waste; $7.34/sample	All
5	Soxtherm for extraction of solids	Region 2, OSWER – Edison, NJ	75% time saving; $5,000/year	All
6	Modified GC for pesticides and semi-volatile CPDs	OSWER - Edison, NJ	66% time saving	All
7	P-type HPGE detector for radiological samples	NAREL - Montgomery, AL	30-50% increase in sample throughput	All
8	Eichrom method for Pu, Th, U	NAREL - Montgomery, AL	60% time saving	All
9	Field: X-ray fluorescence; mercury analyzer; GC/MS	Region 7, OSWER - Edison, NJ	Time saving due to fewer samples sent to fixed lab for analysis; cost saving in fixed lab for avoiding unneeded analysis	All
10	Tedlar air sampling bags	OSWER - Edison, NJ	$240 per sample	All
11	Scanner Van, in-situ system, etc. for radiological analysis of large areas	RIENL - Las Vegas, NV	Not available	Some
12	In-house method validation	NRMRL - Ada, OK	$130,000 in labor costs	Some
13	Microwave digestion for alpha spectroscopy	RIENL - Las Vegas, NV	Reduction in acids and alkaline neutralizer	Some
14	Midi-distillation of water for cyanides	Region 2, OSWER, NRMRL - Edison, NJ	90% reduction in sample volume, waste and reagents	All

Exhibit 26. Efficient Analytic Procedures: Laboratory Improvements Planned, 2007-2010

Item	Brief Description	Lab Name/ Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	Quantitative PCR – microbiological determinations	Region 2	50% per sample; $90,000 annual estimated savings	All
2	SPE in-line with large volume injection GC/MS	NRMRL - Ada, OK	Not available	All
3	Rapid alpha spectroscopy and rapid taping method	RIENL - Las Vegas, NV	Savings in time, reagents and waste disposal	Some
4	Enhanced automated system for air analyses	OSWER - Edison, NJ	50% time savings	All

4.7 Other Significant Initiatives

4.7.1 Introduction and Key Concepts

During the process of developing categories to organize the suggestions described in this report, we discovered that some suggestions do not fit easily into categories. These miscellaneous items are described as "other significant initiatives." On the following pages, these significant initiatives are grouped and described across several sub-categories: integration, restructuring, reduction, and improvements in efficiency. In Appendix 6, these sub-categories are identified in the "Focus of Project" column.

The majority of these items are related to Agency programs that accomplish administrative goals, such as increased efficiency of operations and programs, increased consistency and standardization of intra-Agency programs, reduction in administrative costs, and more effective use of resources.

Integration of programs and job functions within co-located Agency entities has proven to reduce costs and provide equal or better services with lower FTE requirements. Although the majority of items presented address administrative functions such as human resources, safety, and contract personnel, other items such as analytical support, building/facility maintenance, environmental programs (waste disposal and "green" programs), and physical security were shown to have potential for improvement.

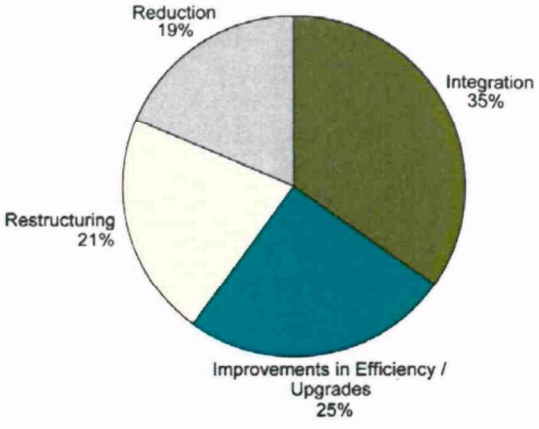
Efforts to restructure laboratory processes using available resources have shown great potential for increasing efficiency and reducing costs. Process restructuring also may be effective across the diverse workforce in many EPA laboratories (e.g., federal employees, visiting scientists from academia or other agencies, and personnel from the Senior Environmental Employee Program [SEEP]).

The ability to develop and adapt laboratory processes, and to validate analytical and sampling procedures, represents one of the most significant opportunities to increase productivity, increase efficiency, and reduce waste. In some instances, the acquisition of new and better laboratory instruments and field screening equipment results in increased sample throughput and reduced costs while ensuring the continued quality of data.

Some of the opportunities described in the next section require initial expenditures in order to reduce costs over a longer period. Some activities and opportunities result in direct savings for the cost of supplies, while others save time and/or increase capability. It is important to note that the cost of implementing many opportunities should be evaluated and balanced with factors such as potential increases in throughput, increased efficiency, reduction in energy costs, and reduction of waste generated.

4.7.2 Opportunities for Improvements in Other Significant Initiatives

Exhibit 27. Diversity of Other Significant Initiatives in Response to Location-Specific Cost Savings Questions



(Total number of other significant initiatives = 75.)

While the opportunities in this section do have potential for application at additional laboratories, both time and flexibility will be required to implement them. For successful application at additional laboratories, employees and managers must first (1) assess who these recommendations could apply to, then (2) identify and evaluate the costs and benefits of different options, and (3) initiate efforts to adapt to these changes before they have been implemented. After the changes have been implemented, a system to evaluate their results should be in place. The highlights in the following sections provide valuable information for EPA's laboratories to consider.

4.7.2.1 Resource Sharing

Sharing of resources and services at co-located facilities across office, program, laboratory, and division boundaries provides an opportunity for EPA to use resources and staff effectively and to increase productivity.

Some facilities have accomplished, or plan to accomplish, integration of basic services such as communication, maintenance, and janitorial services. Resource sharing suggestions demonstrate that significant savings have been achieved. Facilities continue to explore resource sharing for other services such as safety and health, management of hazardous waste, record keeping, and chemical inventory.

Avoided costs identified in integrating facility support functions (e.g., trash removal, recycling, help desk call center, wide area network/local area network (WAN/LAN) and general facility operations) were approximately $287,000.

- Integration of administrative functions resulted in avoided costs of $250,000 in 2007. Integration of analytical and laboratory support services within a Division and/or Laboratory has been found to be beneficial to avoid costs and increase overall throughput.

Integration of PBX services with other laboratory services on an "in-house" basis resulted in avoided costs of about $25,000 and integration of telecommunication and voice services, approximately $289,000.

Two barriers were identified by EPA laboratories that may inhibit application of some suggestions. First, EPA facilities co-located with non-federal governmental entities cannot participate in mutual contracts due to an Office of General Council interpretation of OMB circular 1-97 (1969). Second, co-located facilities may have different security level ratings, making establishment of a comprehensive security contract difficult.

4.7.2.2 Approaches to Workforce Planning and Human Resources

A number of EPA laboratories identified opportunities to restructure approaches to workforce planning and human resources that may result in increased efficiency, effectiveness, or cost-savings. Examples identified by EPA laboratories include:

Restructuring laboratory protocols to rely significantly on internal analytical and field capabilities.

- Including greater flexibility in work schedules has allowed laboratories and field sampling groups to improve support for scientific programs and to respond flexibly to unpredictable conditions such as weather changes.

- Implementation of successful alternative employment programs, such as the Senior Environmental Employee Program (SEEP) through many parts of EPA may create a diverse workforce and provide scientific and clerical support.

- Shared duties at co-located facilities may result in resource savings. Savings demonstrated in one location amounted to $40,000 per year.

- Incorporating performance-based concepts in contracts has provided additional operations and maintenance savings of approximately $60,000 per year. Restructuring instrument maintenance and service contracts to cover multiple instruments or multiple locations may result in improved efficiency and significant savings in contract costs.

Several suggestions identified by EPA laboratories focus on workforce planning and future hiring as areas in which changes may result in increased efficiency or effectiveness. Examples include increasing the number of technicians (and the ration of technicians to principal investigators) and expanding opportunities for career development.

4.7.2.3 Reduction

Several suggestions indicate that establishing management systems (such as safety, heath, and environmental management systems) will create more efficient and effective procedures that result in reduction of waste (hazardous and non-hazardous), creation of efficient protocols, and reduction of materials and supplies. Examples provided by EPA laboratories include:

Developing a functional acquisition strategy to manage and oversee contracts for similar functions may result in avoided costs; in this example the savings are about $100,000 per year.

Identifying alternative approaches to prepare for emergency response communication requirements may result in avoided costs. One laboratory indicated that it was less expensive to provide phone cards with Internet access to essential personnel than to continue the current system.

Use of an equipment management system to reduce equipment maintenance plans by actively managing equipment replacement schedules and costs resulted in avoided costs of approximately $70,000 from FY 2004 through FY 2006.

4.7.2.4 Improvements in Efficiency

Several suggestions indicate that opportunities exist to improve efficiency on computer software and management systems. Examples provided by EPA laboratories include:

- Upgrades to Information Technology (IT) systems have resulted in increased productivity, expanded usage, and reduced costs. One laboratory described cost-savings of approximately $15,000.
- Increased use of LAN-based systems and standard software packages can reduce costs. At one laboratory, the creation of a dedicated LAN (rather than the use of a shared system) resulted in savings of approximately $2,800 per year, while the use of centralized software analysis and repair programs saved approximately $90,000.
- In several locations, expanding the use of Lotus Notes systems (to incorporate reservation functions, procurement approvals, work requests, leave and timesheet recording, award nominations, and travel requests) has improved efficiency.
- Implementing a new Laboratory Information Management System (LIMS) has reduced the need for manual entry of data, thereby increasing the ease and accuracy of data transfer.
- Increasing the use of Web-based training reduces travel and training costs while providing additional flexibility and access to courses.
- Application of indefinite quantity contracts (IDIQs) in research activities has reduced administrative costs.
- Use of new high speed data storage and backup systems permits the Agency to consolidate various individual backup systems, improving efficiency and reducing costs.
- Purchase and incorporation of new and better analytical instrumentation will increase productivity, increase throughput, reduce waste, and require less personnel.

New and more useful screening tools can minimize the number of samples sent to laboratories for analysis, reducing associated costs.

4.7.3 Conclusion and Key Recommendations

Collectively, the suggestions described in this section represent a diverse assortment of proposed and implemented activities. Despite this diversity, many suggestions represent promising initiatives that merit consideration by EPA laboratories.

The majority of these suggestions improve the efficiency and effectiveness of laboratory administration and operation; many also reduce costs. The location-specific nature of these suggestions requires careful analysis and planning before they are applied at other laboratory facilities. Communication across the Agency's laboratory network will help identify practical lessons learned from other laboratory facilities.

4.7.4 Implemented and Planned Improvement Tables

Exhibit 28. Other Significant Initiatives: Laboratory Improvements Implemented, 2004-2007

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	Integration of human resources function	ORD/NRMRL/ Cincinnati	$250,000 in 2007	All
2	Elimination of integrated private branch exchange (PBX) functions	OAR/Office of Radiation and Indoor Air (ORIA)/RIEML/ Las Vegas	Reduction in costs & better function/approximately $25,000	Some
3	Integration of telecommunications	ORD/NERL/ERD & Region 4/ Athens	Same service, less costs	Some
4	Integration of PBX & voice	ORD/NERL/ERD & Region 4/ Athens	Same service, better costs/ approximately $289,000	Some
5	Integration of inorganic lab support	ORD/NERL/HEASD & OAR/ Office of Air Quality Planning and Standards (OAQPS)/RTP	Information about any savings is not available	Some
6	Integration of facility support contracts	ORD/NERL/ERD/Athens	Same service, better response & costs/ approximately $100,000	Some
7	Integration of trash removal & recycling	ORD/NERL/ERD/Athens	Better service/approximately $4,000	Some
8	Integration of help desk, security cards, WAN/LAN	ORD/NERL/ESD/Las Vegas	Approximately $100,000	Some
9	Integration of lab support services	ORD/NHEERL/RTP	Contracts	Some
10	Integration of facility support	OARM	Triage of services/ approximately $82,640	All
11	Reduction of service agreements	OSWER/ERT/Edison	Use of in-house resources/ approximately $65,000 to $95,000	Some
12	Reduction of contracts	Region 10/Manchester	Use of in-house resources/ costs	All
13	Reduction of contracts	Region 5/Chicago	Use of in-house resources/ approximately $500,000 over 2.5 years	Some
14	Alternate workforce utilization	OECA/OCEFT/NEIC/Denver	Information about any savings is not available	Some
15	Reduction in extramural expenses	ORD/HEASD & OAR/OAQPS/RTP	Hiring personnel to reduce contract costs/approximately $670,000	All
16	Restructure workforce	ORD/NHEERL/WED/Corvallis	Increase tech ratio to 1:1/ approximately $800,000	Some

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
17	Labor restructure	Region 10/Manchester	Utilization of alternative labor resources; information about any savings is not available	Some
18	Labor restructure	Region 3 & OPP/Fort Meade	Use of SEEP employee to save labor costs	Some
19	Shared labor in co-located programs	OSWER/ERT/Edison	Glass washing/approximately $50,000	Some
20	Reduction in service contracts	Region 2, OSWER/ERT, & ORD/ NRMRL/Edison	Use of 3rd party vendors, single service vendor of multiple instruments, reduced plans of coverage, & multi-year agreements/ approximately $40,000	All
21	Reduced number of service contracts	Region 5/Chicago	Removal of older equipment from service/($1000s)	Some
22	Performance-based contract for O & M	OAR/OTAQ/NVFEL/Ann Arbor	O&M restructure/ approximately $60,000	Some
23	Reduction in project officers by use of functional acquisition strategy	ORD/NRMRL/ Cincinnati	Use of same PO for projects with similar functions/ approximately $100,000 & 0.7 FTE	All
24	Reduction in record support contract	Region 4 (SESD)	Reduction in record management personnel/ approximately $30,607	Some
25	Staff reduction at Environmental Services Assistance Team (ESAT)	Region 9/Richmond	Decrease in use of mobile laboratory/approximately $140,000 from 2003-2007	Some
26	Reduction in Iridium card charges	OAR/ORIA/NAREL/Montgomery	Support of emergency response requirements/ savings N/A	Some
27	Reduction in equipment maintenance plans	ORD/NRMRL/ Cincinnati	Equipment management system/approximately $16,600 in FY04, $7,300 in FY05, & $44,000 in FY06	All
28	Removal of data collection system from network	OAR/OTAQ/NVEFL/ Ann Arbor	Simplification of data collection and storage/ approximately $200,000	Some
29	Increase in use of Lotus Notes in form approval	ORD/NHEERL/Gulf Breeze	e-systems automation/ approximately $160	All

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
30	Creation of LAN	OAR/ORIA/RIENL/ Las Vegas	Reduction in contract support costs/approximately $2,800	Some
31	Improvement in IT systems	OECA/OCEFT/NEIC/Denver	Increased capabilities/ approximately $15,000	All
32	Electronic transfer of data systems	Region 7/Kansas City	Move toward a paperless office/costs N/A	Some
33	Centralized software analysis and repair	OAR/ORIA/NAREL/Montgomery	Approximately $90,000	Some
34	Upgrade to use LIMS	OSWER/ERT/Edison	Information about any savings is not available.	Some
35	Use of IDIQ Contracts	OAR/ORIA/NVEFL/Ann Arbor	For gas detection system/ approximately $25,000	Some

Exhibit 29. Other Significant Initiatives: Laboratory Improvements Planned, 2007-2010

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
1	Combination of SACOs at location	ORD/NERL/ESD/ Las Vegas	1 FTE Reduction, OARM oversight savings	Some
2	Administrative support integration	ORD/NERL/ESD/ Las Vegas	1 FTE Reduction, OARM oversight savings	Some
3	Standardization and centralization of IT, communication, security, property management & HR function	OAR/ORIA/RIENL/ Las Vegas	Reduction in FTEs and associated costs	All
4	Integrated help desk support for co-located entities	ORD/NERL/ERD & Region 4/Athens	Reduction in costs and contract oversight; savings have not been determined (see R4 submittal campus approach 3.b.)	Some
5	Integrated contract for records management for co-located entities	ORD/NERL/ERD & Region 4/Athens	Reduction in costs and contract oversight; est. savings $50,000/yr. (see R4 submittal campus approach 3.a.)	Some
6	Integrated contract facility support and security for co-located entities	ORD/NERL/ERD & Region 4/Athens	Reduction in costs and contract oversight	Some
7	Assessment of chemical use	Region 7/ Kansas City	Reduced quantities of chemicals on-hand or ordered	All

Item	Brief Description	Lab Name/Location	Key Improvement and Avoided Costs or Savings (quantification if available)	Potential to Apply across EPA Laboratories? (All / Some)
8	Examination of alternative chemical analyses	Region 7/Kansas City	Reduction in chemicals used and waste generated; increases in general safety	All
9	National security contract	OAR/OTAQ/NVFEL/ Ann Arbor	Consistence in programs & reduced costs	All
10	Combined custodial and guard contract	ORD/NHEERL/RTP	Reduced costs and reduction in number of CORs and COs	All
11	Integrated security, mail and custodial contract	OSWER/ERT & ORD/NRMRL/ Edison	Reduced costs and reduction in number of CORs and COs	All
12	Reduction in number of guards at R 4 SESD	Region 4/SESD/ Athens	Reduced costs	All
13	Upgrades to software, software management tools and hardware for IT	OAR/OTAQ/NVFEL/ Ann Arbor	Better and increased service	All
14	Upgrade software to better use LIMS	OSWER/ERT/ Edison; OAR/ORIA/ RIENL/Las Vegas	Improve efficiency and data storage	All
15	Reduction in number of Blackberry PDAs	Region 4/SESD/ Athens	Reduction in costs	All
16	Utilization of IT contract from partner agency	OAR/OTAQ/NVFEL/ Ann Arbor	Costs savings ($80,000 from each $1,000,000 spent; management cost reduced 8%)	Some
17	Telecommunications integration	OAR/ORIA/RIENL/ Las Vegas	Contract management savings	Some
18	Adoption of more flexible scheduling for sampling analysis	OECA/OCEFT/ NEIC/Denver	Better efficiency time management	Some
19	Restructuring of workforce	Region 10/ Manchester	Utilized stay-in-school temporary clerical personnel and innovative staffing programs (Department of Veterans Affairs, intern, volunteer, and student programs) to assist EPA staff	Some

5.0 Summary and Next Steps

This chapter presents a summary of findings from the near-term laboratory review and briefly discusses "next steps." The near-term review would not be an accurate account of the status of EPA laboratory activities without recognizing the degree to which Agency employees have taken ownership of their roles as protectors of the environment and good stewards of public funds. As a result of collecting and organizing laboratory responses for this report, the significant commitments and experience of EPA employees have become evident. These commitments include actions that "green the government" and reduce facility footprints—not only for the sake of reducing costs, but because it is the right thing to do. Those of us who have contributed to this effort are convinced that, with this report and further communication across Agency laboratories, many more opportunities to improve laboratory efficiency and effectiveness can be identified and implemented.

5.1 Summary

The objective of the near-term study is to identify efficiency and effectiveness opportunities at individual EPA laboratories. With strong support and feedback from EPA laboratories, this objective has been accomplished.

Most of the 516 opportunities described in this report affect the operation and maintenance of laboratory facilities. A majority of opportunities highlighted in Chapter 4.0 represent tangible results—that is, actions or best practices from 2004-2007 that are being implemented in at least one EPA laboratory—that may be applicable to a number of other EPA laboratories. These opportunities and results represent a short-term snapshot of the activities underway within EPA laboratories that is not intended to be systematic or quantitative.

Over the course of the past ten years, requirements to adopt energy, water consumption, environmental management, and sustainable facility goals have increased dramatically across the federal government. For example, the Energy Independence and Security Act (EISA) of 2007 and Executive Order 13423 represent the most recent additions to requirements for federal agencies to advance the nation's energy security and environmental performance by achieving ambitious goals related to energy efficiency, renewable energy, sustainable buildings, water conservation, fleets, toxics reductions, acquisition, electronics stewardship, and recycling. Significant long-term investments of expertise and time, as well as capital and operating funds, are required to achieve these requirements and goals.

These goals and requirements are particularly important for federal laboratory facilities because of their complexity, cost of operation, and energy consumption. For example, to meet the energy reduction goals established by the EISA and by Executive Order 13423 through the end of fiscal year 2015, EPA must reduce energy consumption across all its facilities each year by an amount equivalent to the energy consumed by one or two typically-sized laboratories.

Within EPA, OARM has a leadership role in facilities management, sustainable development, environmental management, and compliance with facilities-related Congressional legislation and executive orders. OARM, in partnership with EPA's laboratories and laboratories from other federal agencies, has demonstrated leadership in designing and operating sustainable, efficient, and effective laboratories. This report represents one example of the OARM partnership with EPA laboratories—as well as a pioneering effort to focus on 39 laboratories from among the more than 200 facilities that EPA leases, owns, and operates.

The actions and best practices described in this report reflect a strong commitment by EPA laboratory staff and facility managers to responsibly manage the government's resources. The actions and best practices highlighted in Chapter 4.0 have multiple benefits: they often avoid cost increases, are environmentally responsible, and enable employees to work more effectively or efficiently. Moreover, the scale of efficiencies described in Chapter 4.0 spans a wide range—from avoided costs of hundreds of thousands to a few hundred dollars. To date, some of the most

significant efficiencies gained are in the area of energy efficiency, and in the sharing of resources among laboratory facilities. Exhibit 2 in Chapter 1.0 succinctly highlights the key opportunities in each of the seven categories discussed in Chapter 4.0.

A number of the opportunities described in Exhibit 2 and Chapter 4.0 can be implemented by laboratory and facility managers with an investment of expertise and time. For example, information in the water conservation section (4.4) indicates that the development of comprehensive water management assessments at individual laboratory facilities helps conserve and manage water use. This best practice can be applied broadly across EPA's laboratory network.

In addition to investments of expertise and time, a second class of opportunities described in Exhibit 2 and Chapter 4.0 would require investments of capital and operating funds. Several examples are described in the energy reduction section (4.1). In these examples, monetary investments would result in significantly decreased energy consumption. The Agency could realize the avoided costs associated with reduced levels of energy consumption.

5.2 Next Steps

The information in this report serves as a guide to inform future actions in EPA's laboratories. The report itself helps the Agency transfer knowledge about short-term opportunities and results in a systematic manner across EPA's laboratory network. For these reasons, EPA plans to distribute this report widely across its laboratory network and to urge laboratory and facility managers to adopt these commonsense actions and best practices wherever appropriate. Effective distribution and communication will help laboratory and facility managers make informed decisions about investments of expertise, time, capital and operating funds to achieve long-term improvements in laboratory efficiency and effectiveness.

Appendix 1.0
Acronyms/Abbreviations

ACH	Air change per hour
AHU	Air-handling unit
AOS	Accelerated one-step
ASE	Automated solvent extraction
AWBERC	Andrew W. Breidenbach Environmental Research Center
B&F	Building and facility
BAS	Building Automation System
BMP	Best Management Practice
BPA	Blanket Purchase Agreement
BTU	British Thermal Unit
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFM	Cubic feet per minute
CLP	Contractor Laboratory Program
CMMS	Computerized Maintenance Management System
CRT	Cathode Ray Tube
CV	Continuous Air Volume
CWA	Clean Water Act
DI	Deionized
DNA	Deoxyribonucleic acid
EISA	Energy Independence and Security Act of 2007
EMAP	Environmental Monitoring and Assessment Program
EMP	Energy Management Plan
EMS	Environmental Management System
EPA	Environmental Protection Agency
EPAct	Energy Policy Act of 2005
ERT	Environmental Response Team
ESAT	Environmental Services Assistance Team
ESPC	Energy Savings Performance Contract
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
fpm	Feet per minute
FTE	Full-time equivalent
FY	Fiscal Year
GC	Gas chromatography
GC/MS	Gas chromatography/mass spectrometer

GSA	General Services Administration
HEASD	Human Exposure and Atmospheric Sciences Division
HPGe	High Purity Germanium
HVAC	Heating, ventilation, and air conditioning
IAG	Interagency Agreement
IDIQ	Indefinite quantity contract
IT	Information Technology
K	1,000
kVA	Kilovolt Ampere
LC/MS/MS	Liquid Chromatography/Mass Spectrometry/Mass Spectrometry
LCD	Liquid-crystal display
LEED	Leadership in Energy and Environmental Design
LIMS	Laboratory Information Management System
LLE	Liquid-liquid extractors
LSCWG	Location-Specific Cost Savings Workgroup
MCEARD	Microbiological and Chemical Exposure Assessment Research Division
MCF	1,000 cubic feet
MOU	Memorandum of Understanding
NERL	National Exposure Research Laboratory
NHEERL	National Health & Environmental Effects Research Lab
NIEHS	National Institute of Environmental Health Sciences
NOAA	National Oceanic and Atmospheric Administration
NPSR	National Pesticide Standards Repository
NRMRL	National Risk Management Research Laboratory
NTC	NHEERL Toxicogenomics Core
NVFEL	National Vehicle and Fuel Emissions Laboratory
O&M	Operations and Maintenance
OAR	Office of Air and Radiation
OARM	Office of Administration and Resource Management
OAQPS	Office of Air Quality Planning and Standards
OCEFT	Office of Criminal Enforcement, Forensics and Training
OECA	Office of Enforcement and Compliance Assurance
OMB	Office of Management and Budget
OPPTS	Office of Prevention, Pesticides and Toxic Substances
ORD	Office of Research and Development
ORIA	Office of Radiation and Indoor Air
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OTAQ	Office of Transportation and Air Quality

OW/TSC	Office of Water's Technical Support Center
PBX	Private Branch Exchange
PCB	Polychlorinated Biphenyls
PCR	Polymerase Chain Reaction
PL	Public Law
PMA	President's Management Agenda
psi	Pounds per square inch
qPCR	quantitative Polymerase Chain Reaction
RCRA	Resource Conservation and Recovery Act
RFQ	Request for Quotation
RO	Reverse Osmosis
RTP	Research Triangle Park
SDWA	Safe Drinking Water Act
SEEP	Senior Environmental Employee Program
SFPB	Sustainable Facilities Practices Branch
SHEMD	Safety, Health and Environmental Management Division
SPE	Solid Phase Extraction
TCEQ	Texas Council on Environmental Quality
TIOA	Timed input/output automata
TSCA	Toxic Substances Control Act
UPS	Uninterruptible Power Supply
USGS	United States Geological Survey
VAV	Variable air volume
VOC	Volatile Organic Compound
WAN/LAN	Wide Area Network/Local Area Network
WSWRD	NRMRL's Water Supply and Water Resources Division
XRF	X-ray fluorescence

Appendix 2.0

Functions across EPA's Laboratory Network

Establish protective standards and regulations including the laboratory science needed to establish standards; permitting, registering, and certifying operations related to regulated entities; and implementing voluntary programs.
Provide analytical and scientific support for regulatory programs including measuring parameters mandated in environmental statutes or regulations; and the development, testing, and verification of agency-approved methodologies.
Conduct environmental measurement and monitoring including instruments and technology for determining environmental conditions, changes in conditions, or the status and trends of particular environmental indicators.
Develop and apply systems for quality oversight including quality assurance, quality control, auditing, laboratory certification, and standards for laboratory certification.
Prepare for and respond to emergencies including training, certifying, and overseeing contractors involved in emergencies or threats; responding to emergencies; remediating problems if they do occur; investigating and recovering costs; providing information to support public health decisions; and providing information to the public.
Prepare for, detect, and respond to threats to homeland security and to the nation's drinking water supplies—including training, certifying, and overseeing contractors involved in threat response; remediating problems if they do occur; providing information to support public health decisions; and providing information to the public.
Oversee and implement EPA regulations by state, local, and tribal governments including state implementation plans; Superfund contractors and Superfund contract laboratories; Superfund and RCRA data validation activities; analytical services; technical support for regulatory methods and method equivalency issues; and scientific and technical support to characterize emerging environmental and human health problems on a local-to-regional scale.
Provide technical assistance, training, and technology transfer including the transfer of scientific tools, data, processes, and technologies—across EPA; to other federal agencies; to states, tribes and local governments; to non-government organizations, industry, and academia; internationally; and to the general public.
Provide technical support and analytical services to enforce EPA standards and regulations including monitoring and enforcing compliance with standards; facility and discharge compliance inspections; conducting investigations for regional and national civil and criminal prosecutions; fast-response analysis of environmental samples associated with egregious violations of environmental regulations (at the request of U.S. attorneys); preparation of expert testimony; and providing scientific and technical support for enforcement actions by state, local, and tribal governments.
Conduct research and development including core research to better understand complex environmental, biological, and ecosystem processes; problem-driven research to create a scientific foundation for EPA decisions related to specific statutes; research to develop indicators and measurements of the condition and change in condition of the environment and human health; advice and assistance for specific clients in EPA and in state, tribal, and local governments; and collaboration with other federal, state, and non-government organizations to address priority research topics related to EPA's strategic goals.
Communicate with the public and stakeholders including public access to the results of laboratory activities; performance, quality systems, and accountability data; information about laboratory certification; and the data and analyses needed to assure information quality.

Appendix 3.0

Congressional Statutes Related to EPA's Mission and Responsibilities

1958	Federal Food, Drug, and Cosmetic Act; 21 U.S.C. 409
1966	Freedom of Information Act; 5 U.S.C. 552
1969	National Environmental Policy Act (NEPA); 42 U.S.C. 4321-4347
1970, 1977, 1990	Clean Air Act (CAA); 42 U.S.C. s/s 7401 et seq.
1970	National Environmental Policy Act; 42 U.S.C. 61 et seq. 4321-4347
1972	Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); 7 U.S.C. s/s 135 et seq.
1972	Federal Water Pollution Control Act Amendments; P.L. 92-500
1972	Marine Protection, Research and Sanctuaries Act; 33 U.S.C. 1401 et seq. P.L. 92-532
1973	Endangered Species Act (ESA); 7 U.S.C. 136;16 U.S.C. 460 et seq.
1974	Safe Drinking Water Act (SDWA); 42 U.S.C. s/s 300f et seq.
1976	Toxic Substances Control Act (TSCA); 15 U.S.C. s/s 2601 et seq.
1976	Environmental Research, Development, and Demonstration Authorization Act of 1976; P.L. 94-475 42 U.S.C. 4361-4370
1976	Resource Conservation and Recovery Act (RCRA); 42 U.S.C. s/s 321 et seq.
1977	Clean Water Act (CWA); 33 U.S.C. ss/1251 et seq.
1980	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); 42 U.S.C. s/s 9601 et seq.
1982	Asbestos School Hazard Abatement Act; P.L. 98-377 Title II of TSCA
1986	Superfund Amendments and Reauthorization Act (SARA); 42 U.S.C. 9601 et seq.
1986	Emergency Planning & Community Right-To-Know Act (EPCRA); 42 U.S.C. 11011 et seq.
1986	Asbestos Hazard Emergency Response Act; P.L. 99-519 Title II of TSCA
1988	Asbestos Information Act; 42 U.S.C. 7401, 7412, 7414, 7416 (amendment to CAA)

1988	Ocean Ban Dumping Act; P.L. 100-688 (amendment to Marine Protection, Research and Sanctuaries Act)
1988	Lead Contamination Control Act; P.L. 100-572 (amendment to SDWA)
1988	Indoor Radon Abatement Act; P.L. 100-551 Title III of TSCA
1990	Pollution Prevention Act (PPA); 42 U.S.C. 13101 and 13102, s/s et seq.
1990	Oil Pollution Act of 1990; 33 U.S.C. 2702 to 2761
1992	Residential Lead-Based Paint Reduction Act; P.L. 102-550 Title IV of TSCA
1993	Government Performance and Results Act of 1993; P.L. 103-62
1996	Food Quality Protection Act (FQPA); P.L. 104-170
1999	Chemical Safety Information, Site Security and Fuels Regulatory Relief Act; P.L. 106-40 (Amends Section 112(r) of the CAA), 42 U.S.C. 7412
2002	Public Health Security and Bioterrorism Preparedness and Response Act of 2005; P.L. 107-188.
2005	Energy Policy Act (EPAct) of 2005; P.L. 109-58, 42 U.S.C. 15801
2007	Energy Independence and Security Act (EISA) of 2007; 42 U.S.C. 17001

Appendix 4.0

EPA's Laboratory Facilities and Buildings

Office	Laboratory	Location	Ownership	Mission / Functions
Office of Air And Radiation (OAR)				
OAR	National Air and Radiation Environmental Laboratory (NAREL)	Montgomery, AL	EPA owned	Comprehensive environmental laboratory for measuring environmental radioactivity and evaluating its risk to the public.
OAR	National Vehicle and Fuel Emissions Laboratory	Ann Arbor, MI	EPA owned	Responsible for developing national regulatory programs to reduce air pollution from mobile sources; evaluating emission control technology; testing vehicles, engines, and fuels; providing states with information on transportation and incentive-based programs; and determining compliance with federal emissions and fuel economy standards.
OAR	Radiation and Indoor Environments National Laboratory	Las Vegas, NV	Leased	Provides technical support for numerous radiation protection and control activities, conducts site investigations, radon assessments and evaluations, health assessment modeling, and indoor air studies.
Office of Enforcement and Compliance Assurance (OECA)				
OECA	National Enforcement Investigations Center	Denver, CO	Leased	Provides facilities, equipment, personnel, and expertise needed for measurement activities, data evaluations, and investigations conducted to support civil and criminal environmental enforcement efforts.
Office of Prevention, Pesticides, and Toxic Substances (OPPTS)				
OPPTS	Analytical Chemistry Laboratory	Fort Meade, MD	EPA owned (managed by EPA Region 3)	Technical support and chemical analyses of pesticides and related chemicals; new multi-residue analytical methods development; and operation of EPA's National Pesticide Standard Repository.
OPPTS	Microbiology Laboratory – Environmental Science Center	Fort Meade, MD	EPA owned (managed by EPA Region 3)	Performance (efficacy) measurement and testing of antimicrobial products with public health claims, e.g., hospital disinfectants; research on methods to measure the efficacy of various types of antimicrobials including sporicides; and validation of methods used to identify genetic events and proteins for plant incorporated protectants.
OPPTS	Environmental Chemistry Laboratory	Bay St. Louis, MS	Leased	Test method evaluation for pesticides in soil and water; quality assurance technical support to EPA regional, federal, and state laboratories; analytical method development; and analytical support to national dioxin initiatives and monitoring studies.

Office	Laboratory	Location	Ownership	Mission / Functions
Office of Research and Development (ORD)				
ORD	National Exposure Research Lab			Provides scientific understanding, information and assessment tools to reduce and quantify the uncertainty in the Agency's exposure and risk assessments for all environmental stressors with divisions that include:
ORD	Atmospheric Sciences Modeling Division	RTP, NC	Page Road Bldg. leased (managed by OARM)	Performs much of the air pollution meteorology research for the Agency, conducts in-house research, and manages numerous cooperative agreements and contracts.
ORD	Ecological Exposure Research Division	Cincinnati, OH	EPA owned (managed by OARM)	Conducts laboratory and field studies aimed at providing research products that enable the Agency to conduct predictive and retrospective exposure assessments.
ORD	Ecosystems Research Division	Athens, GA	EPA Owned	Conducts research on organic and inorganic chemicals, greenhouse gas biogeochemical cycles, and land use perturbations that create direct and indirect, chemical and non-chemical stressor exposures and potential risks to humans and ecosystems.
ORD	Environmental Sciences Division	Las Vegas, NV	Leased	Conducts research, development, and transfer programs on environmental exposures to ecological and human receptors. Develops methods for characterizing chemical and physical stressors, with special emphasis on ecological exposure.
ORD	Human Exposure and Atmospheric Sciences Division	RTP, NC	EPA owned (managed by OARM)	Conducts research to characterize exposures, across the whole of the exposure assessment paradigm from the pollutant source to the exposed person or receptor.
ORD	Microbiological & Chemical Exposure Assessment Research Division	Cincinnati, OH	EPA owned (managed by OARM)	Conducts research to measure, characterize and predict the exposure of humans to chemical and microbial hazards.
ORD	National Health & Environmental Effects Research Lab			The Agency's focal point for scientific research on the effects of contaminants and environmental stressors on human health and ecosystem integrity. NHEERL divisions include:
ORD	Environmental Carcinogenesis Division	RTP, NC	EPA owned (managed by OARM)	Conducts mechanistically-based research to explain the association between environmental pollution and cancer.
ORD	Experimental Toxicology Division	RTP, NC	EPA owned (managed by OARM)	Responsible for pharmacokinetics research; examines pulmonary, immunological, hepatic, cardiovascular, and renal toxicity resulting from environmental contaminants.

ORD	Human Studies Division	RTP, NC	Leased (managed by OARM)	Conducts clinical and epidemiological investigations to better understand human responses to pollution.
ORD	Neurotoxicology Division	RTP, NC	EPA owned (managed by OARM)	Studies the effects of chemical and/or physical agents on the nervous system.
ORD	Reproductive Toxicology Division	RTP, NC	Leased (managed by OARM)	Evaluates the effects of environmental pollutants on human reproduction and development.
ORD	Atlantic Ecology Division	Narragansett, RI	EPA owned	Studies the effects of contaminants and other stressors on the coastal waters and watersheds of the Atlantic seaboard.
ORD	Gulf Ecology Division	Gulf Breeze, FL	EPA owned	Assesses the condition of coastal ecosystems (wetlands, bays, estuaries, and coral reefs) in the Gulf of Mexico and analyzes causes of change to ecological status.
ORD	Mid-Continent Ecology Division	Duluth, MN Grosse Ile, MI	2.4 Leased Water Front Land EPA owned	Performs research to protect freshwater ecosystems and wildlife and to understand the basic processes and mechanisms involved in aquatic toxicity.
ORD	Western Ecology Division	Corvallis, OR Willamette, OR Newport, OR	JSB building leased EPA owned EPA owned	Evaluates the effects of chemical contaminants, land use, and global climate change on terrestrial ecosystems and on watershed ecology along the Pacific coast.
ORD	National Risk Management Research Lab			Advances the scientific understanding and the development and application of technological solutions to prevent, control, or remediate important environmental problems that threaten human health and the environment. NRMRL divisions include:
ORD	Air Pollution Prevention and Control Division	RTP, NC	EPA owned (managed by OARM)	This division is responsible for research, development, and evaluation of air pollution control technologies.
ORD	Land Remediation and Pollution Control Division	Cincinnati, OH	EPA owned (managed by OARM)	Conducts research at the basic level as well as bench- and pilot-scale to explore innovative solutions to current and future land pollution problems.
ORD	Subsurface Protection & Remediation Division	Ada, OK	EPA owned	Conducts research and engages in technical assistance and technology transfer on the chemical, physical and biological structure and processes of the subsurface environment, the biogeochemical interactions in that environment and fluxes to other environmental media.

Office	Laboratory	Location	Ownership	Mission / Functions
ORD	Sustainable Technology Division	Cincinnati, OH	EPA owned (managed by OARM)	Mission of this division is to advance the scientific understanding, development and application of technologies and methods for prevention, removal and control of environmental risks to human health and ecology.
ORD	Technology Transfer and Support Division	Cincinnati, OH	EPA owned (managed by OARM)	Serves as a focal point for technology transfer activities, communication, and coordination of information on ORD's science activities and research programs with Agency Program and Regional Offices, state and local governments, universities and other federal agencies.
ORD	Water Supply and Water Resources Division	Cincinnati, OH	EPA owned (managed by OARM)	Conducts research to help prepare the primary and secondary regulations for drinking water and to develop technologies and strategies for controlling waterborne contaminants.
		Milford, OH	EPA owned (managed by OARM)	
		Edison, NJ	EPA owned (managed by Region 2)	
Office of Solid Waste & Emergency Response (OSWER)				
OSWER	Office of Superfund Remediation Technology Innovation/Environmental Response Team (ERT) - Response Engineering and Analytical Contract (REAC)	Edison, NJ	EPA owned (managed/ operated by REAC contractor)	Provides analytical support to the Regional Offices and Headquarters programs, specifically in the areas of Removal, Remedial, Emergency Response, Oil and Homeland Security. The laboratory is available 24/7 and provides a broad spectrum of chemical and physical analyses, analytical method development and validation, biological studies, environmental engineering studies, bio-remediation, and air monitoring.

Office	Laboratory	Location	Ownership	Mission / Functions
Regional Offices				
Region 1	New England Regional Laboratory	North Chelmsford, MA	Leased	The focus of the regional laboratories is on the application of science policies and methods in support of regulatory and monitoring programs as well as special projects. This is done through direct implementation and through partnerships with a variety of groups including state, local and tribal governments, private industry, the academic community, EPA program offices, ORD and the public.
Region 2	Division of Environmental Science and Assessment Laboratory Branch	Edison, NJ	EPA owned	
Region 3	Environmental Science Center	Fort Meade, MD	EPA owned	
Region 4	Analytical Support Branch	Athens, GA	Leased	
Region 5	USEPA Region 5 Lab, Central Regional Lab	Chicago, IL	Leased	
Region 6	Environmental Services Branch Houston Laboratory	Houston, TX	Leased	
Region 7	Regional Science & Technology Center	Kansas City, KS	Leased	
Region 8	USEPA Region 8 Lab	Golden, CO	Leased	
Region 9	USEPA Region 9 Lab	Richmond, CA	Leased	
Region 10	Manchester Environmental Laboratory	Port Orchard, WA	EPA owned	

Appendix 5.0

Questions for Laboratories about Location-Specific Cost Savings

The Location Specific Cost Savings Workgroup for the Laboratory Infrastructure Study would like to identify cost savings and efficiency efforts which EPA's laboratories have implemented. This information will help to identify potential cost savings for future Agency budgets, and may suggest 'best practices' in one laboratory that could be replicated elsewhere. We have developed the format below to assist in the submittal and categorization of the information. Savings can be associated with your facility (such as energy, water or space), equipment (reduction in #s of equipment via sharing, less maintenance costs), processes or procedures (reduction in purchase of chemicals, reduction in hazardous waste costs), or administration (such as budget or FTEs). We are looking for any savings at the facility, regardless of whether it is directly associated with the lab operation. Examples should be approximately 1/3 to 1/2 page in length and should include some matrix of savings such as dollar savings or BTU reductions or some other qualitative measure. In order to have some reasonable consistency in measurement, please include a dollar cost savings if at all possible.

Please provide savings in the following categories:

1. Actual cost saving measures or efficiency gains implemented from FY 2004 to present.
2. Cost saving measures or efficiency gains scheduled from now until FY 2011.
3. Cost saving measures or efficiency gains which could be implemented from now until FY 2011 but are not on an official schedule.
4. Cost saving measures which you would like to try but there is a barrier to implementation. Please identify the barrier.
5. Any other measure which you wish to discuss, including any measures which you have tried and which have not been successful. Please also include any significant cost savings prior to 2004 that might be implemented in other laboratory facilities, as well.

Identify any joint projects which you are doing with another laboratory (ORD laboratory and program laboratory, program and regional lab, etc.) which has resulted in cost or time savings. Include any project where, while there might not have been joint work products, there was significant cross discussion between laboratories which lead to efficiencies.

Where laboratories are co-located or in close proximity, identify any existing or potential efficiencies which can be achieved through working together.

To the extent possible, identify how the savings or efficiencies were reinvested or utilized. If the savings for items paid by OARM, such as lease or utilities, please so state.

Please provide this information to Jack Puzak, with a cc to Elizabeth Cotsworth and Lawrence Starfield, by the close of business Friday, March 30, 2007.

EXAMPLES

The following are a couple examples of cost saving write ups.

ENERGY USE REDUCTION THROUGH REDUCED AIR EXCHANGES. The Regional laboratory has 23 hoods and over 70 vents. The use of these hoods and vents results in 8 to 12 air exchanges per hour. The hoods and vents to do not have variable controls and retrofitting them would cost approximately $200,000. The laboratory has a little less than 4 years remaining on its lease and retrofitting the equipment with variable controls will not result in a cost effective pay back. The laboratory has conducted an aggressive assessment of hood and vent needs to determine which hoods and vents are no longer needed and which operations can be consolidated in certain hoods. The laboratory is in the process of shutting down six hoods and 10 vents. The projected savings from this operation is XXX BTU per year and $YYY.

SHARING SAMPLE STANDARDS BETWEEN AGENCIES. The Region 6 laboratory is completing optimization and quantification runs for the analysis of explosives in soils and other matrixes. At the same time, Customs and Border Protection Houston laboratory is also developing their capability to test for explosives. The two agencies have purchased one set of standards for explosives and are using similar instruments. The sharing of standards and joint optimization of the method will save about X months in finalizing the laboratories' ability to perform the analysis and save $Y for reagents.

Appendix 6.0

Suggestions about Commonsense Actions and Best Practices

Heading Definitions

Laboratory: Name and location of the laboratory taking/proposing the cost saving measure/efficiency gain

Category: 1 = cost saving measure/efficiency gain implemented from FY 2004 to present

2 = cost saving measure/efficiency gain scheduled from now until 2011

3 = possible cost saving measure/efficiency gain which could be implemented from now until 2011, but not on official schedule

4 = possible cost saving measure that could be implemented, but prevented by barriers to implementation

5 = additional cost saving measures/efficiency gains including those implemented prior to 2004 (5a), recommended measures (5b), ineffective measures (5c), and any other measures worthy of mention (5d)

Part(s) of Infrastructure Affected: Facility (F), equipment (E), processes and procedures (P), or administration (A)

Section: Section of short-term report that cost saving measure/efficiency gain is included under

Focus of Project: *Main focus of the cost saving action/efficiency gain (e.g. HVAC System, Hazardous Wastes, Lighting, Lab Equipment, etc.)*

Partner(s): Total number of parties participating in cost saving measure/efficiency gain (including laboratory listed), OR name(s) of partners, depending on information provided

Savings: Description of savings resulting from action including, type of cost/energy savings and quantification in dollars, BTUs, or other appropriate units; NE listed if measure proved not effective

Reinvestment of Savings: Brief description of how savings were reinvested in the laboratory

Description: Brief description of the action taken, the proposed action, and/or any foreseen barriers to action

Comments: Notes on any information missing or further explanation of calculation of costs and savings

		Part(s) of Infrastructure Affected							Savings					
Laboratory	Category	F	E	P	A	Section	Focus of Project	Partner(s)	Type	$	Energy	Other	Reinvestment of Savings	Description	Comments
ORD/NRMRL/Ground Water & Ecosystems Restoration Division - Ada, OK	1			X		Analytical Procedures	Equipment		Purchase & Disposal			Reduction in hazardous waste from 300 L to 4.8 L / 1000 samples		The ASPE method has greatly decreased the amount of the toxic chemical methylene chloride that was previously generated by the traditional method (Automated Cartridge Exchanger (ACE)). The ASPE method generates 9.25 mL of organic waste per sample, of which 4.5 mL is non-hazardous methanol. The traditional method generates about 300 mL of hazardous methylene chloride. Savings result from both reduced solvent costs and reduced hazardous waste disposal costs. The actual savings will depend on the number of samples extracted. Extraction of 1000 samples by the ASPE method would result in approximately 4.8 L of hazardous waste, while the traditional method would generate 300 L of hazardous waste.	

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings				Description	Comments
		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
OSWER/Environmental Response Team - Edison, NJ	1			X		**Analytical Procedures**	Equipment		Purchase, Analysis, & Disposal			Reduction in time required for analyses; Reduction in solvent use		Considerable emphasis is being placed upon multiple uses of analytical instrumentation, judicious modification of existing analysis procedures, utilization of more efficient GC columns and consideration of pollution prevention and waste minimization in the selection and use of sample preparation procedures. Existing GC/MS methods have been modified to simultaneously perform analyses for different compound classes, e.g. PCP and DRO/TPH or include additional site-specific target compounds. More efficient and higher temperature stability GC columns are being used to significantly shorten analysis run times from 31 minutes to 10 to 12 minutes while also increasing the number of target compounds from 53 to over 90; thus, increasing sample throughput. For SVOCs, the purchase and usage of Soxtherm extraction units has decreased the sample extraction time period from 15 hours to 3 hours and reducing solvent use from 300 mL to 150 mL/sample. Sample throughput has been increased while simultaneously enhancing compliance with EPA pollution prevention and waste minimization initiatives	
Region 10 - Manchester, WA	1		X	X		**Analytical Procedures**	Equipment		Purchase, Analysis, & Disposal	AOS - $1.52 / Water Sample; SPE - $5.56 / Water Sample; $2,891 / Year savings gained by using SPE for analysis of water samples from Wyckoff Superfund Site*		40% Reduction in time required (4 versus 7 hours per set) for SPE method as compared to stirbar method		In 2006, the Region 10 Laboratory continued to develop and use water sample extraction methods for organic chemical analyses that use less methylene chloride (MeCl) than the procedure used in the past. This former extraction procedure (liquid-liquid stirbar) used 0.45 L of methylene chloride/sample. The new methods developed for semi-volatile organic compounds involve an accelerated one-step (AOS) device which uses 0.06L MeCl/sample and a solid phase extraction (SPE) procedure which use 0.025L MeCl/sample. Currently, the AOS uses a membrane at a cost of $10/sample and the SPE uses an extraction disk at a cost of $7/sample. The savings per water sample take into account the cost of purchasing ($12.75/L) and disposing of MeCl (about $16.80/L), and membrane and disk costs. SPE will be the primary procedure used for water sample extractions at the Region 10 Laboratory through 2007. The stirbar method may still be used for water samples that are highly colored or that contain high solids levels.	*The Wyckoff Superfund Site produces ~520 semi-volatile organic compound water samples for extraction per year. This project is expected to need this level of analytical support for many years to come. The stirbar method which was used in the past for this project would have cost $6,916 per year based on the above assumptions. The SPE method which will be used thru 2007 at a projected cost of $4,025 creates a savings of $2,891/year in terms of MeCl purchase, disposal and material costs. To be noted, the methods developed in 2006 were specific to the Wyckoff project's needs, and as such, the cost savings for other projects will be dependent on the type of membranes, disks and MeCl volumes needed for these applications.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings				Reinvestment of Savings	Description	Comments
		F	E	P	A				Type	$	Energy	Other			
Region 10 - Manchester, WA	1		X	X		Analytical Procedures	Equipment		Purchase	$0.20-$0.40 / Sample; Elimination of cost of replacing water bath set-up (Approx. $2,500)		40-75% Reduction in reagent use		Incorporation the of a hot block system for mercury analyses of water samples. The quantities of nitric acid, sulfuric acid, and potassium permanganate used as chemical reagents have been reduced as a result, while still meeting the quality control requirements specified in the EPA methods. In addition, the hot block is more rugged than the water bath set-up which had to be replaced every few years, at a cost of ~$2,500 each.	
Region 7 - Kansas City, KS	1		X	X		Analytical Procedures	Equipment		Purchase			50% Reduction in reagents		A SEAL instrument has been procured and its use has resulted in the reduction of reagents by half over the older instrumentation.	
Region 7 - Kansas City, KS	1		X	X		Analytical Procedures	Equipment		Purchase, Analysis, & Disposal			50% Reduction in solvent usage		For solid sample preparation, the ASE300 reduces solvent use roughly by half versus the traditional techniques of soxhlet or sonication.	
Region 7 - Kansas City, KS	1		X	X		Analytical Procedures	Equipment		Purchase, Analysis, & Disposal			Reduction in solvent usage from 180 mL to 30 mL		For water sample preparation, solid phase extraction reduces solvent use significantly (30 mL from 180 mL) versus the traditional liquid/liquid extraction technique. The Horizon 4790 is an automated solid phase extraction system; its use results in the reduction of about one-half the amount of solvent used over the manual solid phase extraction process.	
Region 7 - Kansas City, KS	1		X	X		Analytical Procedures	Equipment		Purchase, Analysis, & Disposal			Reduction in time required & solvent usage		The extraction and clean up procedures for samples being analyzed for dioxins and furans has been automated. While the extraction process utilizing the ASE300 results in the reduction in the use of solvent, the automated cleanup procedure does not.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 7 - Kansas City, KS	1		X	X		Analytical Procedures	Equipment		Purchase			Reduction in time required & amount of reagents used		The use of a new Mercury analyzer (DMA80) eliminates the need for any reagents which were required by the cold vapor technique. The elimination of the need for reagents is also accompanied by a decrease in analysis time.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 8 - Golden, CO	1		X	X		Analytical Procedures	Equipment		Purchase, Analysis, & Disposal					Modified LLE method to utilize micro LLE setup, resulting in reduction in required sample volume (1 liter reduced to 40 mL) and significant savings in transportation, analytical, and disposal costs.	No quantification of savings. FURTHER INQUIRY NEEDED.

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OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	1		X	X		Analytical Procedures	Method Modification		Purchase, Analysis, & Disposal			Reduction in time required for sample analysis (25 FTE Hours / 20 Samples with Eichrom as compared to 65 FTE Hours / 20 Samples with TIOA); 85% Reduction in acid usage with Eichrom; elimination of mixed waste		When analyzing soil samples for Pu, Th, and U, the Eichrom method has proven to be 60% more efficient that the previously used TIOA method. Actinide analysis with the Eichrom method has also reduced acid consumption and eliminated the production of mixed waste.	
ORD/NRMRL/Ground Water & Ecosystems Restoration Division - Ada, OK	1			X		Analytical Procedures	Method Modification	Region 1 & Region 6	Purchase, Analysis, & Disposal	Savings Not Yet Known				Currently GWERD, EPA Region 1, and EPA Region 6 are jointly developing a method for the "Automated Analysis of Organic Compounds in Aqueous Environmental Samples using Solid Phase Extraction Coupled, In-line, with large volume Injection GC-MS." This method is expected to provide significant cost savings in labor, materials (standards, chemical supplies, instrument purchase, operation, i.e. energy, and maintenance), and hazardous waste disposal costs compared with the current method which uses a liquid extraction procedure. Preliminary method development work has been completed and work is continuing to complete the development by the end of FY 2007.	
Region 7 - Kansas City, KS	1		X	X		Analytical Procedures	Method Modification		Purchase, Analysis, & Disposal			Reduction in time required & solvent usage		A few analytical methods are similar enough in their extraction techniques that samples can be extracted simultaneously for different analyses. One example is the extraction for diesel can be performed simultaneously with the extraction for pesticides.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1		X	X		Analytical Procedures	Other							Automation of the calibration of all major emission analytical systems at NVFEL allowed mobilization of five new compliance test sites without increasing quality control staff. This has also resulted in an overall improvement in the accuracy of systems for two reasons: (1) Data is no longer hand entered, and (2) During this project, NVFEL eliminated all working gases and replaced them at the sites with primary standards that were all read directly off the NIST Standard Reference Materials.	Type of savings not specified and no quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 7 - Kansas City, KS	1		X	X		Analytical Procedures	Other		Purchase					The preparation of samples for metals analysis has been modified which has resulted in the reduction of both nitric acid and hydrochloric acid.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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ORD/NRMRL/Ground Water & Ecosystems Restoration Division - Ada, OK	1			X		Analytical Procedures	Within EPA Labs	ORD/NERL - Cincinnati, OH	Analysis	$130,000				In 2005, GWERD performed a second laboratory validation of a method for the analysis of perchlorates by LC-MS-MS developed by ORD NERL laboratory in Cincinnati. This method validation saved over 2 man years of labor costs ($130 K) and development time of over one year to develop a similar method at GWERD.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	2		X			Analytical Procedures	Equipment		Labor					Automated instruments purchased for the laboratory have greatly increased sample throughput capability of the laboratory while maintaining level FTE requirements.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	2			X		Analytical Procedures	Equipment		Energy & Analysis					R&IE has invested in modern automated equipment to replace manual single-sample analyzers. This new equipment - Gamma Analyst, Gamma Matic, and I-Matic - are robotic automated sample changers that can effectively process up to 50 samples in a single batch. These new automated analyzers will reduce the cost of manpower, reduce the amount of energy needed, and reduce the amount of time needed to run and process all of the manual samplers.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OSWER/Environmental Response Team - Edison, NJ	2		X	X		Analytical Procedures	Equipment		Energy, Purchase, Analysis, & Disposal			Potential 50-60% reduction in sample waste; Potential 30-50% reduction in reagent usage		In 2007, transition to a hot block digestion from the standard water bath digestion for mercury will be implemented. Currently the water bath temperature is difficult to regulate under a laboratory hood and more energy is expended to reach the temperatures required for the mercury analysis. Because heat surrounds the digestion vessels in a hot block, less electrical energy per sample is required. A uniform temperature across the block with minimal heat loss results in higher throughput of samples and less re-work. Waste minimization will result in a safer workplace, lower purchase and disposal costs, and less waste placed into the environment.	
Region 10 - Manchester, WA	2		X	X		Analytical Procedures	Equipment		Analysis			75% Reduction in time required		The Region 10 Laboratory recently purchased a Thermalcycler DNA Engine Tetrad 4 Block unit. This new piece of equipment will be used for Microbial Source Tracking and will essentially cut the time required to conduct Polymerase Chain Reaction methods by 75%. This time savings is important given the growing demand for molecular methods in support of TMDL projects.	

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Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	2			X		Analytical Procedures	Equipment		Purchase, Analysis, & Disposal	Approx. $8,000 / Year				In the implementation of the Accelerated One-Step Continuous Liquid-Liquid Extractors (CLLE), glassware is easily installed/removed by one analyst. The operation is unattended after initial set-up since the sample extraction, concentration and drying of the extract is performed by the CLLE unit. Since there is no apparatus change between extraction and concentration, it reduces sample handling and overall technician time required to perform the procedure, leading to approximately a reduction of about 33% in set up time. Pesticides extraction can be completed in 5.5 hrs instead of 18 hrs using the normal liquid-liquid extraction method. Sample extraction for semi-volatile organics can be completed in a 12 hour period versus 36 hrs using the normal liquid-liquid extraction method. The extraction process only requires 100 mLs solvent instead of 500 mLs, a reduction of 80% solvent volume used to extract a 1-liter water sample. This reduces solvent emissions, solvent cost and solvent disposal. Based on the Laboratory's annual workload, this new procedure should provide a savings of approximately $8,000 per year.	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	2			X		Analytical Procedures	Equipment		Purchase, Analysis, & Disposal	Approx. $5,000 / Year				The Region 2 Laboratory currently uses a traditional Soxhlet extraction technique to extract semi-volatile analytes from sediment, soil, or solid matrices. The Laboratory has the capability of extracting 16 samples over a 16 to 18 hour period. Recently the Laboratory purchased automated Soxhlet extractors (Soxtherms), capable of extracting 16 samples over a 4 hour period, allowing for the extraction of a second set of 16 samples, or a total of 32 samples over an eight hour period, thus doubling the daily amount of sample extraction capacity. Since the Soxtherm process uses 140 mLs of solvent (Methylene Chloride) per sample (approximately 2.5 liters for 16 samples) versus 250 mLs of solvent (Methylene Chloride) per sample using the traditional process (approximately 5 liters per 16 samples) solvent usage will be reduced to approximately half. Based on the Laboratory's annual workload, this new procedure should provide a savings of approximately $5,000 per year.	

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OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	2		X	X		Analytical Procedures	Method Modification		Labor			Various increases in efficiency of analyses		Several changes were intended to increase throughput capacity without increasing FTE requirements: i) 60% rel. efficiency coaxial P-type HPGE detector system with 50 sample capacity automatic sample changer for 2" planchets: Increase througnput capacity for gamma isotopic analysis of smears or air filters by about 30%, from 260/day to ~340/day; ii) 4-detector proportional counting system with 400 sample capacity automatic sample changer for 2" planchets: Increase throughput capacity for counting smears or air filters for gross alpha/beta by about 50%, from1000 to ~1500/day; iii) Low-energy-optimized coaxial P-type HPGE detector with shield, dewar, and electronics: Provide a new capability to rapidly measure (by gamma spectroscopy) smears and air filters for Plutonium; and iv) 12 single sample liquid scintillation counters (one unit) (allows for simultaneous counting of 12 samples): Increase throughput capacity by about 400%, from the current 30/day to about 150/day for alpha and low energy beta analysis for smears, air filters and water.	For items i, ii, and iv, the time savings are proportional to the throughput capacity increases. For item iii, the time required to produce quantitative results for Plutonium in air or on smears was reduced from 2 days to 2 hours.
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	2			X		Analytical Procedures	Method Modification		Energy & Analysis	$90,000 / Year in process costs; 1,300,000 in equipment costs				The Region 2 Laboratory is implementing an emerging technology, quantitative Polymerase Chain Reaction (qPCR) as a potential replacement for conventional microbiological methods, which have been in use for over 30 years. Chemical impacts, energy costs and other process costs were compared between our existing traditonal methods and implementing the qPCR method for all analyses. The process cost for each measurement on an annual basis was reduced by 50 percent, and the annual cost of ownership will save almost $90,000 per year. The lifetime cost of ownership, which includes the costs of the instrumentation, was estimated to be a savings of $1,300,000. Much of this savings was in the areas of energy reduction and labor costs. The laboratory has purchased the equipment and will be implementing qPCR for our beach monitoring program and microbial source tracking. qPCR is a new technology in the environmental field. One limiting factor is that methods for regulatory use are not yet available.	

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Region 7 - Kansas City, KS	2			X		Analytical Procedures	Method Modification		Purchase, Analysis, & Disposal			Reduction in samples collected & preservatives used		The biologists in the Analytical Section have proposed the revision the method currently used to collect fish samples for enumeration and identification in support of ecological assessments of streams. The proposal is to perform more stream-side identification of fish specimen in the field rather than preserving them and bringing them back to the laboratory for processing. This proposal would greatly reduce the number of fish unnecessarily sacrificed, and would greatly reduce or eliminate the use of formalin as a preservative. The reduction or elimination of use of formalin would also reduce or eliminate the need for disposal of this hazardous waste as well.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	2			X		Analytical Procedures	Rapid/Field Analysis		Analysis & Disposal					R&IE has developed analytical methods for rapid turnaround of results. These methods - Rapid Alpha Spectroscopy and Rapid Taping Method - will reduce the amount of reagents used in the analysis, reduce the manpower involved in preparing the analysis, and reduce the amount of waste that requires subsequent clean-up.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	2			X		Analytical Procedures	Rapid/Field Analysis		Energy & Analysis					R&IE has developed specialized equipment for the surveying of large areas for possible radiation contamination. This equipment - Scanner Van, FRGS, and In Situ systems - incorporates forward thinking about taking detection equipment into the field rather that sending teams out to collect samples and transport them back to the laboratory. These tools have demonstrated extensive savings over avoided conventional laboratory analysis.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 7 - Kansas City, KS	2		X	X		Analytical Procedures	Rapid/Field Analysis		Analysis & Disposal					Region 7 is leveraging significant resources toward using field screening techniques for environmental characterization which lowers overall laboratory sample handling, analytical and disposal costs. Field screening methods such as portable x-ray fluorescence instruments, hand-held mercury analyzers and field portable GC/MS systems allow for much more efficient use of laboratory grade reference measurements when screening level thresholds are exceeded in the field.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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OSWER/Environmental Response Team - Edison, NJ	3			X	X	Analytical Procedures	Within EPA Labs		Analysis			Regional data users will typically receive preliminary analysis results in 5 business days versus 10 business days for an outside laboratory		Significant EPA cost savings may be obtained in the future by having existing contractor personnel perform trace level VOC air analyses as opposed to having the analyses performed at an outside laboratory. A new GC/MS system, autosampler and air concentration system will be purchased for the ERT Laboratory to allow contractor personnel to significantly increase sample analysis throughput for vapor intrusion investigations. Additional SUMMA canisters and low flow orifices will need to be acquired to obtain the greatest cost saving benefit from the new analytical instrumentation. The lack of space (facility/building limitations described below) prevents the acquisition of additional GC/MS and air concentration systems, which could increase the laboratory's air sample analysis capability and throughput and provide further EPA cost savings for important soil vapor investigations.	
Region 5 - Chicago, IL	4		X	X		Analytical Procedures	Hindrance		Purchase & Disposal					Currently regulatory methods may not recognize new analytical instrumentation and procedures that would cut costs associated with the use of less reagents and their appendant waste stream disposal. For example, new automated discrete analyzers for waste water analysis would need extensive and expensive validation for approval as an alternate test procedure. Additionally, the use of solvent and time saving equipment such as SPE and ASE for TSCA PCB sample extraction could replace liquid/liquid and Soxhlett extractors required in the regulatory methods. Barrier: Cost of validation and approval of new instrumentation and procedures.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	5a		X	X		Analytical Procedures	Equipment		Disposal					In the mid 90's R&IE converted to alpha spectroscopy methods using microwave digestion that reduced hydrochloric and nitric acid consumption, as well as sodium bicarbonate used to neutralize the waste acid.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	5a			X		Analytical Procedures	Equipment		Purchase, Analysis, & Disposal			50% Reduction in sample volume; 50% Reduction in reagent usage		In 2002, the Region 2 Laboratory instituted a new method for the digestion of water and soil samples for the determination of metals. The old method used hot plates and water baths to generate the 95C needed to heat the aqueous or soil samples that are mixed with acids. The hot plates and water bath temperature were difficult to regulate under a laboratory hood and more energy was expended to reach the temperatures required for the procedure. Because heat surrounds the digestion vessels in a hot block, less electrical energy per sample is required. A uniform temperature across the block with minimal heat loss results in higher throughput of samples and less re-work. In addition to the efficient heating, smaller sample volume was required for the vessels used in the block digesters. This led to an approximate 50% reduction of sample volume on average. This results in less corrosive sample waste generated and a 50% reduction in the amount of reagent used, e.g., acids.	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	5a			X		Analytical Procedures	Equipment		Purchase, Analysis, & Disposal			90% Reduction in sample volume; 90% Reduction in reagent usage		In 2002, the Region 2 Laboratory instituted a new method for the distillation of water samples for the determination of Cyanide. The old method used 500 mLs of sample and 50 mLs of Sulfuric Acid along with some reagents. The implementation of the midi-distillation method resulted in a 90% reduction of sample volume. This results in 90% less corrosive sample waste generated and a 90% reduction in the amount of reagent used, e.g., acids.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a			X		Analytical Procedures	Method Modification		Energy & Water					The OPP Microbiology Laboratory also developed data to support large load sterilization runs. The data supported the conclusion that combining waste into one run cycle was feasible. The laboratory has integrated language into the Standard Operating Procedures to combine waste for autoclaves run. This effort has resulted in a decrease in water and energy consumption.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a			X		Analytical Procedures	Method Modification		Energy, Purchase, Analysis, & Disposal					The OPP Microbiology Laboratory streamlined the Agency's Antimicrobial Testing Program to gain efficiencies. The ATP initially required testing of three lots of products. After analyzing the data developed by the laboratories over several years, it was determined that one lot of product testing would be adequate to support the enforcement and regulatory programs. Moving toward one lot testing has significantly reduced the energy, people resources, supplies, materials and waste generation at the Environmental Science Center, as well as at the three state laboratories who work in partnership with the EPA on this initiative.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 7 - Kansas City, KS	5b			X		Analytical Procedures	Equipment		Purchase			Reduction in solvent use		The use of micro-extraction procedures has resulted in the reduction of solvent use in extraction processes. Alternatives to solvent extractions and use of such solvents as methylene chloride result in reduction in the amount or types of chemicals used in sample preparation, extraction and clean up procedures and in the amount of hazardous wastes generated. RECOMMENDED	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 5 - Chicago, IL	5c			X		Analytical Procedures	Hindrance		Analysis					Heavily contaminated water samples cannot be used with several automated sample extraction devices. Therefore older procedures which use more reagents and take additional time must be used. The Agency should investigate any new equipment that may be on the market to overcome this limitation.	
OSWER/Environmental Response Team - Edison, NJ	5d		X	X		Analytical Procedures	Rapid/Field Analysis		Purchase, Analysis, & Disposal			Reduction in amount of samples analyzed using definitive data analytical methods		REAC chemists have provided analytical support on numerous sites using field-portable instrumentation such as x-ray fluorescence (XRF); Lumex, Jerome and Tracker mercury monitors and GC/MS. Using real-time measurement technologies, preliminary characterizations of the site, expanded site coverage than would typically be accomplished using traditional sampling procedures and less mobilizations contribute to time and cost savings and a more focused and informative sampling event. Preliminary results offer an acceptable means of making decisions in the field; thus, providing overall project management savings.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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OSWER/Environmental Response Team - Edison, NJ	5d		X	X		Analytical Procedures	Rapid/Field Analysis		Purchase, Analysis, & Disposal	$240 / Sample ($60 / Sample analyzed with Tedlar® bag in field, compared to $300 / Sample analyzed in lab with SUMMA® analysis)		Reduction in time required (real-time results with Tedlar® bag analysis, compared to 7 day turnaround time with SUMMA® analysis)		The ERT/REAC field analytics/TAGA group has developed a fast Tedlar® bag analysis method for VOCs that can be used with MS/MS or GC/MS systems in a mobile lab onsite. These on-site sample analyses have a significantly lower per-analysis cost than their standard analytical counterparts. The availability of real-time data allow unexpected results to be addressed during one field deployment, minimizing the potential need for return visits to the field for additional data collection. Redundant mobilization and demobilization costs, along with the accompanying expenses of work plan and supporting documentation development, are eliminated. This supports the EPA's Triad approach of accelerating project schedules, reducing overall project costs, and improving project outcomes.	
ORD/NERL/HEASD & OAR/OAQPS - RTP, NC	1		X	X		Chemical Resource Management & Waste Reduction	Chemical Adoption / Donation		Disposal	Approx. $500 / Year				The ongoing chemical adoption program diverts chemical containers to re-use, thus reducing the volume of hazardous waste generated.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1	X	X	X	X	Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal					NVFEL has an active Environmental Management System (EMS) and has been ISO 14001 certified since March 2006. This provides cost avoidance by preventing or minimizing spills, and records are readily available that eliminate fines and fees. Additionally, all mercury has been eliminated from NVFEL, thereby eliminating any possible releases and hazardous material clean-up costs.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	1			X		Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal	$5,000				Outdated/excess chemicals donated to local colleges and universities for research and/or teaching purposes. FY 2007, GED donated 114 gallons of chemicals to two universities, saving the cost of disposal through the hazardous waste program.	
ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	1			X		Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal	$4,000 / Year				Use of alternative treatments to neutralize or degrade hazardous wastes, allowing for conventional disposal rather than disposal as hazardous wastes.	

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OSWER/Environmental Response Team - Edison, NJ	1			X	X	Chemical Resource Management & Waste Reduction	Hazardous Wastes	Region 2 & ORD Facilty	Storage & Disposal					A single comprehensive hazardous waste handling, storage and disposal program is provided for the ERT Laboratory, EPA Region II Laboratory and an ORD facility. Administrative costs have been minimized by temporarily storing waste from all three parties in the same facility. Substantial cost savings have been obtained by having a single licensed vendor pickup and dispose of hazardous waste for all three parties on a regular scheduled basis to maintain compliance with maximum temporary storage time periods for all three waste generators. To minimize cost, a junior level chemist whose activities are monitored by a senior level hazardous waste coordinator performs most day-to-day waste handling activities.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 1 - Chelmsford, MA	1			X		Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal	$350 Saved from 2004-2005		8% Reduction in volume of samples disposed from 2004-2005 (Approx. 50 Gallons)		NERL has minimized the amount of hazardous waste shipped off site by minimizing sample volume collected for each analysis. NERL has made a conscious effort to reduce the amount of sample required to perform analysis and in turn has educated the personnel collecting samples of the minimum sample size required. For example, on some large projects with multiple sample sets coming to the laboratory, the chemists have informed the personnel to reduce the amount of sample that is being collected.	

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Region 1 - Chelmsford, MA	1		X	X		Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal	Approx. $1,500 in 2006				NERL has minimized the amount of hazardous waste shipped off site for disposal by utilizing the onsite wastewater treatment system (WWTS). The laboratory uses the WWTS to perform pH adjustment on select hazardous waste streams in the laboratory. The main focus is preserved water samples and instrument reservoirs with no contaminants. During 2006, NERL treated 955 pounds or 155 gallons of hazardous wastewater that would have typically been shipped off site for disposal, saving NERL approximately $1,500 in disposal costs in 2006. NERL conducted sampling and analysis in late 2006 to evaluate additional hazardous waste streams that may be treated onsite by the WWTS. The treatment of these additional waste streams were implemented in the beginning of 2007. The NERL anticipates additional savings this year and will continue to explore more uses for the WWTS to reduce hazardous waste disposal costs.	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1	X		X		Chemical Resource Management & Waste Reduction	Hazardous Wastes	OSWER/ERT & ORD/NRMRL	Storage & Disposal					A single comprehensive hazardous waste handling, storage and disposal program is provided for the ERT Laboratory, EPA Region 2 Laboratory and the ORD facility. Administrative costs have been minimized by temporarily storing waste from all three parties in the same facility. Substantial cost savings have been obtained by having a single licensed vendor pickup and dispose of hazardous waste for all three parties on a regular scheduled basis to maintain compliance with maximum temporary storage time periods for all three waste generators. To minimize cost, a junior level chemist whose activities are monitored by a senior level hazardous waste coordinator performs most day-to-day waste handling activities.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	1			X		Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal	$3,200 in CY04; $5,020 in CY05; $3,715 CY06				Although "lab packs" (a number of small containers of different hazardous wastes, are individually packaged into a single traditional 5, 10, 30 or 55 gallon drums) appear cost-effective and efficient from a safety and regulatory perspective, since it is unsafe and illegal to mix different lab wastes in a single container, they are one of the most expensive ways to dispose of laboratory hazardous wastes. Through prohibition on using empty four-liter solvent bottles as hazardous waste containers; and providing reusable five-gallon DOT-Rated closed head polyethylene drums fitted with multi-port sealable funnels as hazardous waste containers, this facility has decreased it's dependence on "lab packs" for waste disposal. For dissimilar wastes, the five gallon drums can be shipped directly off-site as the DOT shipping container for a fraction of the costs associated with lab-packing five 4-liter bottles. For similar wastes, the larger accumulated waste volumes can then be easily transferred from the five-gallon drums directly into larger 30 or 55 gallon bulk drums, realizing additional disposal savings.	
Region 4 - Athens, GA	1		X	X		Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal	$35,637 / Year				In Method 335.2, for total cyanide, standards prepared for the analysis are considered a "P-listed" compound and thus must be disposed of as a hazardous compound unless treatment is possible. Prior to 2003, the SESD used an average of 51.35 L/ yr of cyanide standard. A vendor estimated the cost to pick-up each liter of potassium cyanide after generation was $694/L equating to an annual cost of $35,637. By instituting a cyanide neutralization (using hypochlorite) procedure at the end of the cyanide method, the Waste Reduction disposal cost was avoided.	
Region 4 - Athens, GA	1		X			Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal	$1,020 / Year				Previously, SESD purchased about 12 drums/year for disposal of hazardous wastes at a cost of $85/drum or $1,020/yr. By using recycled drums furnished by the vendor at no cost for the drums, a savings of $1,020 has been realized.	

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Region 6 - Houston, TX	1			X		Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal	Approx. $2,000 / Year				Over pack liquid and solid hazardous waste prior to shipment using 55 gal. drums and approved packing material. Reuse 5 gal. SAA carboys through over packing. Carboys initial cost $40-$60 per unit and can be reused indefinitely.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1			X		Chemical Resource Management & Waste Reduction	Inventory Management		Purchase	Approx. $4,000 / Year				Chemical Hygiene Policy carefully invertories, and verifies before any new purchases are made.	
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1		X			Chemical Resource Management & Waste Reduction	Inventory Management		Storage					Reduced the storage of dated and under-used chemicals from the chemical inventory.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 1 - Chelmsford, MA	1		X	X	X	Chemical Resource Management & Waste Reduction	Inventory Management		Purchase & Disposal	$250-400 / Year		30% Reduction in chemical inventory in 2005 from 2004 levels		NERL has minimized the amount of off-spec chemicals shipped off-site as hazardous waste. NERL has implemented a sign-off procedure for ordering of chemical supplies to minimize excessive orders or order-duplication by multiple people. Under these procedures, NERL requires that the Health & Safety Officer review and sign off on chemical orders, ensuring that minimum volumes are ordered such that the volumes will be used within a three year period. The reduced chemical ordering reduces the amount of chemicals in storage at any one time, reducing the potential for spills, and decreases the amount of chemicals that would go unused and have to be disposed of as hazardous waste.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	1		X	X	X	Chemical Resource Management & Waste Reduction	Inventory Management		Purchase & Disposal					Each ESC organization has procedures in place to control chemical purchases. These procedures attempt to ensure that chemicals are managed so that the least amount of material is purchased and stored at the ESC. Procedures include an independent check of the chemical inventory system so that we don't overbuy, and a review of the requested chemical to see if a different, perhaps less hazardous substitute can be used.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 4 - Athens, GA	1		X		X	Chemical Resource Management & Waste Reduction	Inventory Management			Savings Not Yet Known				New preservation table developed in 2006. The lab revised the preservation guide and reduced amount of sample needed for several analyses. This has the potential of saving some disposal costs for samples that exhibit hazardous characteristics that need to be shipped off-site for disposal (reduced volume).	

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Region 4 - Athens, GA	1		X		X	Chemical Resource Management & Waste Reduction	Inventory Management			< $1,000 / Year				Standards and reagents must be used prior to the expiration date or discarded. Many vendors stamp an arbitrary expiration date on chemicals when they are shipped even though the actual shelf life can be several more years. The laboratory has started a program of recertifying standards where the concentration is verified and the expiration date extended. We plan to broaden this program.	
Region 5 - Chicago, IL	1		X	X	X	Chemical Resource Management & Waste Reduction	Inventory Management		Purchase & Disposal					Removal of mercury from sample preparation/clean-up steps and the minimization of nitrogen and hydrogen gas cylinders. Gas generators which deliver gases on demand were purchased which in turn increase safety for lab personnel and reduces costs of purchase, transport and cylinder rental.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	1	X	X			Chemical Resource Management & Waste Reduction	IT Infrastructure		Purchase					Due to expansion of the networks within NAREL, older switches were re-used instead of purchasing new ones. The lab had a fiber backbone which needed to be expanded to include the new buildings. The fiber switches were at maximum capability for fiber connections. We were able to find and implement converters which allowed a fiber line to link with a standard cable (cat 6) switch. This allowed us to continue using existing hardware instead of out of cycle replacement of the switches.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 8 - Golden, CO	1		X			Chemical Resource Management & Waste Reduction	IT Infrastructure		Purchase	$11,000				Recycling of equipment by salvaging 15 printers and supplies from downtown.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1		X	X		Chemical Resource Management & Waste Reduction	Lab Equipment		Cost of Purchase & Demurrage	Approx. $50,000 / Year		Reduced purchases by 5,000 Cylinders / Year & reduced demurrage by 100 Cylinders / Year		Implementation of bulk liquid storage tanks for both nitrogen and argon gas supplies. Before this change, high purity nitrogen use averaged 12 cylinders per day, with high purity argon use in the range of one cylinder per day.	
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1		X			Chemical Resource Management & Waste Reduction	Lab Equipment		Storage					Reduced the number of gas cylinders stored at the lab.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1		X			Chemical Resource Management & Waste Reduction	Lab Equipment		Cost of Zero Grade Air & Liquid Nitrogen for LC/MS/MS Instruments	$17,000 in first year; Approx. $32,800 / Year thereon				MCEARD has purchased three gas generators for three LC/MS/MS instruments, over the last two to three years, to replace the use of air cylinders or liquified gas Dewars (nitrogen). The use of gas generators allows for unattended and overnight usage of this equipment. This allows for a greater number of analyses within a given period of time, creating improvements in efficiency. There are also substantial cost savings. For example, one particular type of LC/MS/MS instrument utilizes three separate gas streams: zero grade air, ultra high purity nitrogen and oil free air. Annual costs include $33,800/ year for zero grade air and $1500/ year for liquid nitrogen, for a total of $35,300/year. A zero air/nitrogen gas generator was purchased for $18241.30. At the current rate of gas use, the cost of the generator will be recovered in approximately 27 weeks. Savings in the first year alone is approximately $17,000. Assuming annual maintenance costs for the generator of $2500 per year, savings in subsequent years is approximately $32,800.	
Region 10 - Manchester, WA	1		X			Chemical Resource Management & Waste Reduction	Lab Equipment		Operations & Maintenance			Reduction in space occupied; Reduction in labor/monitoring requirements; Useable capacity of system increased from 80% to approx. 100%		Installation of a 1500 L liquid nitrogen (LN) dewar distribution system to meet the LN supply needs of many of the organic chemical analytical instruments. This system was installed outside of laboratory space and precluded the need for several 180 L dewars that require monitoring and exchanging when empty.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 10 - Manchester, WA	1		X			Chemical Resource Management & Waste Reduction	Lab Equipment		Purchase					Redesigned liquid nitrogen (LN) system by inserting a plug that prevented loss of LN. Previously, LN was allowed to exhaust from the system, prematurely draining the tank.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1		X		X	Chemical Resource Management & Waste Reduction	Lab Equipment		Purchase	$2,400 / Year				Prior to 2004, the Region 2 Laboratory used to purchase liquid Argon, needed for the instruments used for metals analysis, in 240 liter tanks. The Laboratory would generally order four of these tanks each month. The tanks were cumbersome to manage in the laboratory. Many of these 240 Liter tanks were aged and vented more frequently due to reduced insulation, leading to product losses. In 2004, the Laboratory invested in a 1500 liter Bulk Argon tank. The tank is maintained outside of the Laboratory and Argon deliveries are made automatically based on telemetry readings of the level in the tank. The cost per of liquid Argon using the bulk tank and automatic delivery system is approximately $0.80 per Liter. The cost using the 240 Liter tanks was approximately $1.00 per Liter. Based on the Laboratory's annual usage, 12,000 Liters, the cost savings is approximately $2400.	
Region 5 - Chicago, IL	1		X	X		Chemical Resource Management & Waste Reduction	Lab Equipment		Purchase	$6,730		308 L methylene chloride & 112 L concentrated sulfuric acid		Installation of automated and micro-scale sample preparation equipment. Use of ASE and SPE equipment has resulted in reductions in solvent and acid usage and also decreased the cost of removal of waste materials.	
Region 7 - Kansas City, KS	1		X	X		Chemical Resource Management & Waste Reduction	Lab Equipment		Purchase					The Regional Laboratory has been procuring all of the sample containers needed by project managers and their contractors (as applicable) for several years. The programs involved provide the funding. This procedure provides consistency in the type and quality of the containers, eliminates any problems relating to what sample containers to use for what analyses, is more cost-effective to order sample containers in bulk rather than piece meal, and costs less since a contractor will normally add a surcharge to the cost of the containers themselves.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	1		X	X		Chemical Resource Management & Waste Reduction	Office Supplies		Purchase			Paper use reduced to 14 boxes in first two quarters of FY07 (50 boxes used in FY06)		Implemented a configuration on network printers so that by default, all documents are printed double sided. The configuration is checked quarterly to insure compliance. All network printers that did not have the capability to print double sided were replaced. Additional we reduced the number of printers allowed on the network. We implemented a policy and provided training on proper network printing and implemented a limited number of copies that a user was allowed to print versus copy. It is more cost efficient to use the industrial copiers than the network printers for making numerous copies of the same document. This reduced the number of network cartridges and maintenance costs. Additionally, the lab was one of the first users of the EPA electronic webforms program. This allowed us to stop printing leave forms and procurement forms.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	1		X	X		Chemical Resource Management & Waste Reduction	Office Supplies		Purchase					Network printers are configured to 2-sided printing defaults, and the lab makes use of e-forms and webforms as paperless approval systems for commonly used forms.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1		X	X		Chemical Resource Management & Waste Reduction	Office Supplies		Purchase					All printer paper is 100% post consumer content, and all network printers are set for duplex operation.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1	X				Chemical Resource Management & Waste Reduction	Office Supplies		Purchase			Reduction paper usage and waste generated		Touchless hand towel dispensers were installed to compliment existing touchless faucets.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1		X			Chemical Resource Management & Waste Reduction	Office Supplies		Disposal					Eliminated the use of disposable paper ware and plastic utensils from the lunchroom and replaced with reusable plastic/ceramic ware and metal utensils.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1		X			Chemical Resource Management & Waste Reduction	Office Supplies		Purchase					Purchase available "green" office supplies.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 10 - Manchester, WA	1				X	Chemical Resource Management & Waste Reduction	Office Supplies		Purchase					In FY03, the Region 10 Laboratory began providing clients with data reports in PDF (electronic) format, only producing paper reports for the customer when requested.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 10 - Manchester, WA	1				X	Chemical Resource Management & Waste Reduction	Office Supplies		Purchase	$2,080 / Project		Approx. 1200 Sheets of 8.5x11, 544 Sheets of 14x17, and 816 Sheets of 24x36		Reduced paper consumption by limiting the number of copies of engineering drawings and specifications for renovation and construction work. The Laboratory previously received four copies of every document (drawings, both full sheet and half sheets, and specifications) for a total of 12 items at all stages of the projects (35%, 60%, 95% and 100% plans). The Laboratory now receives one large set of drawings, two half sheets, and two copies of the specifications at each stage of the work, representing a 60% reduction in paper consumption.	
Region 10 - Manchester, WA	1				X	Chemical Resource Management & Waste Reduction	Office Supplies		Purchase					The Region 10 Laboratory now uses a QuickPlace site to share health and safety, Environmental Management System, and other information with the Washington Department of Ecology (collocated with the Region 10 Laboratory). This approach has reduced the need for paper reports that had been routinely distributed to Laboratory staff.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	1		X			Chemical Resource Management & Waste Reduction	Office Supplies		Purchase					Use 100% post-consumer content paper in all printers and copiers. All network and local printers are set to print double-sided. Recycling efforts are described below.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 4 - Athens, GA	1			X		Chemical Resource Management & Waste Reduction	Office Supplies		Purchase	$1,225 / Year				The reduction of paper usage has been aggressively pursued through printer duplexing and encouraging staff to minimize printing. The savings have been significant as seen below.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1		X	X		Chemical Resource Management & Waste Reduction	Recycling Program		Purchase & Disposal	$11,000 in 2006				Absorbent pads are used to capture fuels and oils. Instead of single use media that must be disposed of as hazardous waste, NVFEL uses recyclable media that has oils extracted, and returned for re-use.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1			X		Chemical Resource Management & Waste Reduction	Recycling Program		Disposal			$18,262 Pounds electronics recycled w/ zero waste in 2006		All computers and electronics are disposed of using the Recycling Electronics and Asset Disposition (READ) program	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1			X		Chemical Resource Management & Waste Reduction	Recycling Program		Disposal	$13,000 / Year				All paper, cardboard, and metals are recycled, avoiding landfill fees.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1		X	X		Chemical Resource Management & Waste Reduction	Recycling Program		Cost of Purchase & Disposal	$3,000 / Year				Closed loop parts cleaners are used at NVFEL. Instead of replacing their entire volume of solvent, these cleaners filter the existing solvent for re-use.	

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OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1		X	X		Chemical Resource Management & Waste Reduction	Recycling Program		Purchase & Disposal	Approx. $80,000 / Year				Through judicious allocation of UST compartments, fuel (gasoline and diesel) that has been used for testing purposes, but is still viable as transportation fuel can be recycled. This fuel issued in GSA cars and the testing loaner fleet, and the remainder is donated to various nearby public entities. This mitigates disposal costs, which would be substantial, as well as reducing additional fuel purchases.	
ORD/NERL/HEASD & OAR/OAQPS - RTP, NC	1		X	X		Chemical Resource Management & Waste Reduction	Recycling Program		Disposal	Approx. $5,000 / Year				RTP has implemented a battery recycling program.	
Region 10 - Manchester, WA	1			X		Chemical Resource Management & Waste Reduction	Recycling Program		Disposal	Approx. $300 / Year				By implementing an aggressive recycling program, the Region 10 Laboratory prevents large quantities of reusable materials from ending up in the landfill.	
Region 4 - Athens, GA	1		X	X		Chemical Resource Management & Waste Reduction	Recycling Program		Disposal	$2,655 / Year				Several solvents are recycled for reuse. These solvents are methanol, acetone, and methylene chloride. Isopropyl alcohol was recycled prior 2006 but has since been replaced with a detergent that can be disposed down the drain. The solvents are recovered in a spinning side band distillation unit that can produce solvent clean enough to reuse in the extraction lab. Most of the solvent is used for cleaning glass ware. As a result, it may be reused several times.	
Region 4 - Athens, GA	1			X		Chemical Resource Management & Waste Reduction	Recycling Program		Disposal	$95 / Year by recycling cartridges; Savings from recycling other materials undet.				Solid Waste Recycling. In 2006, an initiative of recycling ink jet cartridges was begun with a local office supply store, exchanging cartridges for reams of copy paper. Additional recycling for 2006 included: glass – 3,500 lbs; batteries – 108 lbs; cans – 87 lbs; and Styrofoam – 328 lbs.	
Region 4 - Athens, GA	1			X	X	Chemical Resource Management & Waste Reduction	Recycling Program		Disposal	$720 / Year				Trash/recycling changed to new contract, resulting in reduction in costs of both trash pick-up and recycling. Building owner took over responsibility in 2006 realizing a savings to the owner as well as EPA. Yearly savings for EPA by eliminating rental of a cardboard container is $720/yr. Employees voluntarily haul paper/plastic/glass to local recycling pickup areas.	
Region 8 - Golden, CO	1		X	X		Chemical Resource Management & Waste Reduction	Recycling Program		Purchase & Disposal	$10499.48*				Methylene chloride recycling program.	*Cumulative savings generated by this program from 2001-2006.

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OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1			X	X	Chemical Resource Management & Waste Reduction	Resource Sharing	Across Agency	Purchase	> $1,000,000 / XP Storage Vault				The NVFEL maintains the only Class 1 Div 1 (Explosion Proof or XP") sample storage vault in the Agency, and has traditionally accepted flammable samples required to be stored as evidence for the entire Agency. The shared nature of the NVFEL facility mitigates implementation of additional storage lockers across the Agency.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	2		X		X	Chemical Resource Management & Waste Reduction	Chemical Adoption / Donation		Disposal					The ESC has just begun implementing a cooperative program with several local High Schools to distribute expired but still usable chemicals to the schools. This project will save disposal costs of the chemicals.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	2		X	X	X	Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal	$8,000 / Year resulting from Action 1; cost savings yet to be determine for Actions 2-5				As actions in the EPA/RTP Environmental Management System: (1) Reduce the amount of methylene chloride, hexane, and acetone used in research by 10%; (2) implement measures identified in the federal electronics challenge; (3) paper use reduction and use of 100% recycled paper; (4) require the procurement of "green" products; and (5) increase teleconferencing to reduce travel costs and associated vehicle emissions.	
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	2		X		X	Chemical Resource Management & Waste Reduction	Inventory Management		Purchase, Storage, Disposal					Implement a new chemical inventory system to better track chemicals and wastes.	No information was provided regarding how this would be achieved or what the projected savings would be. FURTHER INQUIRY NEEDED.
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	2		X		X	Chemical Resource Management & Waste Reduction	Inventory Management		Purchase					Reduce the amount of standards ordered to the amount needed for a particular project.	No information was provided regarding how this would be achieved or what the projected savings would be. FURTHER INQUIRY NEEDED.

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Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	2		X		X	Chemical Resource Management & Waste Reduction	Inventory Management		Purchase					The ESC is a consolidated laboratory facility housing R3 and OPP laboratory operations. Though great strides have been made in both organizations to decrease the amount of chemicals on-hand through inventory management and purchasing controls, the facility is moving forward with consolidating its two distinct and separate computerized chemical inventory systems into one database. Currently, only chemical inventory administrators from both organizations can view the chemical inventory of the other organization. Plans have been tentatively approved to consolidate the two chemical inventory systems into a single database, easy viewed and searched by all personnel from both laboratories. It is thought that by increasing the ease in which personnel can directly view the chemical inventory for both organizations, a greater sharing or pooling of the chemical material will result in reductions for the total amount of chemicals purchased, on-hand and unfortunately, disposed of unused due to expiration.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 10 - Manchester, WA	2		X			Chemical Resource Management & Waste Reduction	Lab Equipment		Purchase	$1,700 / Year				The Region 10 Laboratory has acquired a specialized distillation system to create ultra pure nitric acid for trace metals analyses. The distillation system is expected to be installed and tested sometime in 2007.	
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	2		X		X	Chemical Resource Management & Waste Reduction	Office Supplies		Purchase					Continue to purchase available "green" office supplies.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	2		X		X	Chemical Resource Management & Waste Reduction	Resource Sharing		Purchase & Disposal					While the chemical inventory systems are being integrated, the EMS Team established a cooperative program between the OPP and Region 3 labs to assist analysts in finding chemicals that might be located in labs on the other side of the building. Also, if an analyst has chemicals that they would like to offer up before they reach expiration; they could contact the ChemShare Team, who would help them find someone who could use it. This program will save disposal costs for expired chemicals that are not donated to schools via the Chemical Donation Program.	No quantification of Savings. FURTHER INQUIRY NEEDED.

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OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	3			X	X	Chemical Resource Management & Waste Reduction	IT Infrastructure							Employ a tool or service to organize reusable content such as white papers, presentations, spreadsheets and the like into a central repository so that only one copy exists on the IT infrastructure. Access to content would be available with an on-line (Google like) search tool.	Type of savings not specified and no quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	3		X	X		Chemical Resource Management & Waste Reduction	Lab Equipment		Cost of Purchase	$100,000 after $300,000 investment				Purchase of high-pressure gas cylinders and implementation gas blending apparatus will further reduce on-going costs associated with gas standard purchases and cylinder rental. The program would replace current purchases of gas standards with the refill of locally owned cylinders by the use of high pressure, high purity compressors and specialized blending apparatus.	
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	3		X		X	Chemical Resource Management & Waste Reduction	Lab Equipment		Purchase, Storage, & Disposal					Purchase instrumentation which requires less solvent to extract samples, thereby reducing the amount of solvents purchased and waste generated.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	3		X	X		Chemical Resource Management & Waste Reduction	Recycling Program		Purchase & Disposal			Reduction in volume of waste		Implement new recycled waste stream for laboratory Tyvek materials (lab coats, coveralls, etc.) to reduce procurement costs and eliminate wastes. This will not produce a significant cost savings but reduces the volume of waste generated and provides resources to a recycling market and sound environmental stewardship practices.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X	X	X	X	Chemical Resource Management & Waste Reduction	EMS		Energy & Disposal					The ESC has had an ISO 14001 registered EMS since 2003. The EMS provides a framework and systematic way to review all facility operations and activities on a regular basis to determine environmental impacts, and has the added benefit of identifying areas for resources conservation and cost savings. The ESC enjoys a vibrant and active EMS with wide participation by many employees. Many of our other cost saving efforts were a result of the EMS Team's efforts, e.g., the ChemShare Program, School Chemical Donation Program, the chemical management program.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a		X	X		Chemical Resource Management & Waste Reduction	Inventory Management		Disposal					The NPSR has the responsibility of maintaining an inventory of all the pesticide standards and their regulated metabolites that are registered for use in the U.S. While the repository has over 1300 standards, The NPSR concentrates on only having on hand those standards that have been requested by our customers- State and Federal labs that enforce FIFRA. This "just in time" ordering procedure saves the cost of having to dispose of standards which have not been used before their expiration date and reduces the burden to the environment.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a		X	X		Chemical Resource Management & Waste Reduction	Lab Equipment		Purchase					During CY 2006 the NPSR shipped over 6100 standards. In order to comply with shipping regulations the packages are required to be packed to prevent leakage during shipment. In addition to purchasing packing materials, the NPSR reuses certain kinds packing material from shipments that the ACB has received. The reuse of shipping materials saves both money and space in landfills.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a		X			Chemical Resource Management & Waste Reduction	Lab Equipment		Operations & Maintenance					The OPP Analytical Chemistry Branch (ACB) has implemented a system for supplying compressed nitrogen to ACB's laboratories that is more cost effective and is more reliable than using individual tanks or nitrogen generators. The new system called a microbulk system will provide a constant supply of compressed nitrogen to our state of-the art mass spectrometers. These instruments require a continuous Nitrogen supply or they may fail resulting in down-time and repair. The microbulk tank utilizes liquid nitrogen and features a refill system that will automatically, without human intervention, contact the vendor via computerized interface when the supply falls below a set amount. This system is virtually maintenance free, unlike the nitrogen generators we've used in the past that we found to be very costly to maintain. This system will also eliminate the rental or demurrage charges for individual tanks and save ACB a considerable amount of money.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a		X	X		Chemical Resource Management & Waste Reduction	Recycling Program		Purchase & Disposal					Redistill methylene chloride so that is can be reused in analytical procedures.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 9 - Richmond, CA	5a		X	X		Chemical Resource Management & Waste Reduction	Recycling Program		Purchase & Disposal	Purchase savings of $15,735 & disposal cost savings of $11,337 in 2006		487 L Dichloromethane recycled with 93% recovery rate		The Region 9 Laboratory began recycling spent dichloromethane in FY 1994 and continues to see cost savings benefits associated with this program.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a		X	X		Chemical Resource Management & Waste Reduction	Resource Sharing		Purchase	$50,000				The NPSR recently collaborated with the EPA's Office of Research and Development (ORD) to furnish them with over 600 pesticide standards for a large research project. If ORD had to purchase these standards from commercial sources it would have cost approximately $50,000.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a		X			Chemical Resource Management & Waste Reduction	Storage		Storage					The repository is experiencing a problem of high humidity that has caused some standards to degrade and make them unusable by our customer labs. To control the humidity, ACB purchased a humidity controlled cabinet for the standards that are stored at ambient temperatures. This solution was tried in place of changes to the facilities heating cooling and air handling changes or purchasing dehumidifiers for the entire repository complex of four rooms. If successful, this should be the most cost effective solution to a serious problem.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 9 - Richmond, CA	5b		X	X		Chemical Resource Management & Waste Reduction	Chemical Adoption / Donation		Purchase	$800 (by Adopting Dichloromethane from USGS in 2006)*				The Region 9 Laboratory performs periodic assessments of the laboratory chemical inventory to identify excess chemicals or chemicals remaining from procedures no longer performed at the laboratory. These chemicals are made available to various university research laboratories through a Chemical Adoption Program saving the laboratory disposal costs. In addition, through a variety of networks, the Region 9 Laboratory receives notice of the availability of chemicals and laboratory supplies from other laboratories. In FY 2006, the laboratory accepted four cases of dichloromethane from a USGS laboratory which saved about $800 in purchase costs.	*This number represents the savings generated from one specific example of the program.
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	5b			X		Chemical Resource Management & Waste Reduction	Hazardous Wastes		Disposal	$15,000 / Year				EPA/RTP implemented a laboratory waste management bulking program that brought common waste streams into 35 & 55 gallon drums, rather than disposal by individual container. This greatly reduces disposal costs and the volume of materials entering the waste stream. RECOMMENDED	

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings				Reinvestment of Savings	Description	Comments
		F	E	P	A				Type	$	Energy	Other			
Region 9 - Richmond, CA	5c		X			Chemical Resource Management & Waste Reduction	Lab Equipment		NE	NE	NE	NE		In FY 2006, the Region 9 Laboratory investigated whether there was any cost benefit associated with purchasing gas tanks and having them filled as needed by our gas supplier versus our current practice of renting the gas cylinders from our gas supplier. The information that was collected indicated that in addition to charging a filling fee for re-filling our tanks, the gas supplier would also charge a fee for pick-up of our empty cylinders and a fee for hydro testing our cylinders. The lab determined that it would be cheaper to rent cylinders at the current price of $0.30 per day per cylinder.	
Region 10 - Manchester, WA	5c			X		Chemical Resource Management & Waste Reduction	Recycling Program		NE	NE	NE	NE		The Region 10 Laboratory previously distilled used solvent but discontinued the practice because of the labor costs and the quality of the resulting solvent.	
Region 7 - Kansas City, KS	5c			X		Chemical Resource Management & Waste Reduction	Recycling Program		NE	NE	NE	NE		Prior to 2000, the Regional Laboratory was engaged in a glass recycling program. The local market for recycled glass is extremely weak; almost non-existent. We would like to recycle the numerous glass containers in which we receive samples, but there continues to be no viable option other than throwing them away in the dumpster at this time.	
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	5d	X				Chemical Resource Management & Waste Reduction	Hazardous Wastes		Energy					Florescent bulbs and ballasts have been changed throughout the NAREL facility to low mercury containing materials. This reduces our impact on the environment and disposal costs for broken bulbs and ballasts.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1	X	X			Energy Use	Air System		Purchase	Approx. $55,000 / Year		Reduced purchases by 6,000 Cylinders / Year		Implementation of a hospital grade clean air system, coupled with high purity air generation devices, high purity reference air ("Zero Air") for the entire laboratory.	
Region 8 - Golden, CO	1	X	X			Energy Use	Alternative Energy Sources		Energy					Installation of passive solar panels in 2001 to augment heating Hazardous Materials Storage Facility during winter months. Solar wall was down sized from original design and approximately 60% of the original wall is available for installation. Design and installation funds are needed to utilize the remaining solar wall parts. Completion of the project could further demonstrate more efficient solar heating of the space.	No quantification of savings. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	1	X				Energy Use	Building & Facilities		Energy					Cost saving benefits that are expected From the new Secure ER Asset Building (scheduled for occupancy in 2007: i) reduced load on mobile lab A/C units (previously operated outdoors in extreme temperatures); ii) reduced repairs to mobile lab AC units; iii) extended life of vehicle tires (previously destroyed by UV exposure/ozone from outdoor exposure); and iv) elimination of theft replacement costs.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1					Energy Use	Building & Facilities		Energy		33,436 kWh Electricity			The ECL reduced electric KWH consumption from 350196 to 316760, a savings of 33436 KWH.	No information was provided regarding how these savings were obtained. Also, it is not clear if these are annual or cumulative savings. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1	X				Energy Use	Building & Facilities		Energy					Annex I-2005. The new Annex I was designed as office space with a state-of-the-art. energy efficient, VAV (Variable Air Volume) HVAC system.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1	X				Energy Use	Building & Facilities		Energy					Annex II - Gold LEED Certification. The Annex II has been designed as office space consisting of 2 wings totaling approximately 45,000 gsf. The following are some of the "state-of-the-art" energy efficient and green building measures that have been incorporated into the design to make this a Gold LEED certified building: High Efficiency Lighting; Day lighting and controls to dim indoor lighting during daylight hours; occupancy sensors; high efficiency glazing; energy efficient VAV recirculated air handling system; energy efficient under floor air distribution system; variable speed motor drives on all air handlers; variable hot water heating pumps; green roof; storm water retention basin; diversion of construction waste from landfills; use of recycled construction materials; use of white "light reflective" surface concrete; and use of FSC certified wood.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1	X				Energy Use	Building & Facilities		Energy					Bio-Safety Lab Level III-2007. As part of a complete renovation to this lab, energy efficiency gains are being achieved through the installation of new energy efficient air handling units and exhaust fans.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/Ecosystems Research Division - Athens, GA	1	X				Energy Use	Building & Facilities		Energy		30,818 BTUs (FY06 compared to FY 05); 8.38 % Reduction			Implementation of EPA's "Top Ten Energy Savings Operations & Maintenance Practices." This EPA-wide initiative resulted in a utility savings of approximately 8 percent in FY06.	

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	1	X				Energy Use	Building & Facilities		Energy	$20,000-$40,000 / Year*				Additions to research labs including: i) A polarized lubricant to all HVAC systems which greatly reduces friction and improves performance, ii) A 4-state chiller to the Marine Toxicology and Chemistry Laboratory which will require less energy consumption during the mild months and provide a more desirable environment for conducting research, iii) A heat recovery system to the Microbiology Lab and Warehouse (fume fans were reduced from 15 to 2 fans to reduce energy usage and maintenance costs), and iv) An energy efficient sealer to all flat roofs and roll-up doors which reduces the thermal transfer and improves energy efficiency.	*Cumulative savings generated by all four measures described.
ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	1	X				Energy Use	Building & Facilities		Energy	$25,000-$50,000 / Year				Demolition of six energy inefficient buildings. Replacement space under construction through the LEED program (Gold Standard Building) to ensure maximum energy efficiency. Construction should be complete by 2008.	
ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	1	X				Energy Use	Building & Facilities		Energy	$6,000-$12,000 / Year	10-20% Reduction			Installation of modern insulation and double-pane windows in five buildings older than 70 years, reducing drafts, improving the working environment, and increasing energy efficiency.	
Region 1 - Chelmsford, MA	1	X	X	X		Energy Use	Building & Facilities		Energy	Approx. $187,000 / Year*	7,047 Million BTUs saved in FY06 (30% reduction over past two fiscal years)			Over the last two years, the facility manager has worked closely with the property manager to modify the operation of the building in energy-saving ways, including: i) The installation of 23 fan-powered air terminals, which significantly enhanced the heat distribution in perimeter offices; ii) expanding night/ weekend hours when lab and office temperatures and air volumes are moderated in order to save heating and cooling; iii) identifying analytical equipment and processes which can be shut down when not in use and / or batch processed when constant operation is not necessary; iv) manually adjusting chiller / heat supply temperature and humidity controls relative to the demand due to seasonal ambient temperature and humidity loads; v) reducing illumination levels in common areas by utilizing emergency and natural lighting only in building hallways; and vi) conducting daily "end of day" laboratory and office walk-throughs manually closing hoods and shutting lights.	*The laboratory has reduced its energy consumption from 25,154 million British thermal units (mmBtu) in 2004 to 18,107 mmBtu in 2006, for a total reduction of 30%. Using an average mmBtu cost of $26.60, the cost savings from these reductions were $187,451 in fiscal year 2006 alone. Thus, $187,000 is an approximation of the savings that can be expected to come from all of these measures in the future.
Region 10 - Manchester, WA	1	X				Energy Use	Building & Facilities		Energy					Facility renovations have included a variable speed air handler, air volume supply and exhaust flows.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 10 - Manchester, WA	1	X				Energy Use	Building & Facilities		Energy					Optimization of the Building Automation System (BAS) continues. HVAC system controls have been reviewed; air supply terminal unit operation and air flow balance have been corrected. Air handler operation has been modified to prevent concurrent heating and cooling. Reset schedules have been included in heating and cooling loop operation.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/Ecosystems Research Division - Athens, GA	1			X		Energy Use	Employee Behavior		Energy	Savings Not Yet Known				ERD will assure that laboratory doors are not propped open. Keeping them closed minimizes the draw of processed air through the laboratory.	
ORD/NERL/Ecosystems Research Division - Athens, GA	1	X				Energy Use	Employee Behavior		Energy	Savings Not Yet Known				ERD will assure that office and laboratory lights are shut off at the end of each workday	
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	1			X		Energy Use	Employee Behavior		Energy	Approx. $196,200 / Year ($900 / Fume Hood)	40% Reduction			All laboratory personnel have been trained on the need to implement energy reduction features designed into the laboratories at the RTP new facility. Specifically, by manually closing the sash on the laboratory chemical Fume Hoods / Ventilation and turning out the lights, as well as equipment, can produce up to a 40% energy reduction can be achieved during off hours. Employees are typically at over 90 percent compliance on any given day.	
Region 10 - Manchester, WA	1	X	X	X		Energy Use	Employee Behavior		Energy					The Region 10 Laboratory is complying with EPA's 'Top 10 Energy Savings Practices' by: i) lowering the temperature of tap water throughout the facility so as to not exceed the needs of the staff, and reminding staff to use hot water only when necessary; ii) reminding staff to keep variable air volume fume hood sashes closed when hoods are not in use; iii) installing PVC strips in walk-in freezer and one constant temperature room to reduce the energy demands associated with temperature fluctuations during use; iv) resetting thermostats throughout the facility, where practicable, to a 6 degree span of operation; 68F heating and 74F cooling; v) reminding staff to keep doors closed as much as possible to confine heated and conditioned air; vi) installing more efficient lighting equipment (electronic ballasts, T8 tubes, 5 Watt LED exit lights, occupancy sensors, photo cell controlled fluorescent fixtures); and vii) setting up boilers for staged operation, minimizing start-up events and keeping parallel operation to a minimum.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 6 - Houston, TX	1		X	X		Energy Use	Employee Behavior		Energy	$1,000-$2,000 / Year				Regular scheduled shutdown of various equipment (i.e., drying ovens, duplicate instrumentation, unused equipment, etc.) in the building with proper Laboratory management and building maintenance coordination. The Laboratory EMS program requires personnel to turn off lights and electrical equipment prior to departure in the evenings and anytime when not in use. The Laboratory EMS program requires personnel to be energy conscious at all times while at work.	
Region 6 - Houston, TX	1		X	X		Energy Use	Employee Behavior		Energy	$3,000-$5,000 / Year (based on number of personal appliances/ electrical equipment removed from government leased space)				The Regional Laboratory provides and equips a kitchenette/break area so that these appliances may be congregated in those areas for the general well being of all. It is a matter of appearance as well as correctness that we do not allow personal electrical equipment use in government leased space unless there exists a legitimate health issue(s) (i.e. nursing mothers who may request private refrigeration, medication, etc.). Policy implemented 6 Feb 2007.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1		X			Energy Use	Energy Savings Performance Contract		Energy & Water		50% Reduction	78% Reduction in water consumption		Energy Savings Performance Contract Signed in 1998.	

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		F	E	P	A				Type	$	Energy	Other			
OARM - RTP, NC	1	X				Energy Use	Fume Hoods / Ventilation		Energy		34 Billion BTUs (5% reduction) in FY06			The Laboratory Controls Optimization Project (LCOP) and Vivarium Controls Optimization Project (VCOP) were implemented to challenge the operation of a sample of laboratory fume hoods and optimize their airflows. The projects have determined the performance envelope of the ventilation systems and provided information to assess the feasibility of modifying system operation to reduce energy use without jeopardizing safety of the laboratory personnel. Once these desired set-points were established, they were incorporated throughout our main campus laboratories. A Static Pressure Optimization and Reduction Test (SPORT) was also implemented by conducting a series of tests to empirically determine and implement the minimum static pressure set points for the supply and exhaust systems to meet flow requirements during occupied and unoccupied modes. After implementing the minimum acceptable system static pressures, a series of tests were conducted to determine the optimum sequence of exhaust fan and air handler operations. This has resulted in the reduction of air-handlers used on a daily basis.	
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1	X				Energy Use	Fume Hoods / Ventilation		Energy					Decommissioning of hoods not in use (put in standby).	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/Ecosystems Research Division - Athens, GA	1	X				Energy Use	Fume Hoods / Ventilation		Energy	Savings Not Yet Known				ERD has 23 hoods at the main laboratory and one at Bailey Street. ERD management will work with the scientific staff to minimize the amount of time hoods are left open, creating a demand for processed air. The target is to have all hoods closed (within one inch from completely closed) during non work hours and when hoods are not in use.	
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	1	X				Energy Use	Fume Hoods / Ventilation		Energy	Approx. $10,800 / Year (40% Reduction)				Whenever possible, laboratory chemical fume hoods that are not in use have been locked out and air flows reduced to provide approximately 40 % savings in heating / air conditioning to the effected laboratories with an annual estimated savings of $10,800.	

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1	X				Energy Use	Fume Hoods / Ventilation		Energy	$19,800 / Year; Potential additional savings of $17,300 / Year	920 Million BTUs / Year; Potential additional savings of 800 Million BTUs / Year			The Region 2 Laboratory has replaced six fume hoods with models that reduce air flow by approximately 25%, while maintaining adequate capture and user safety. As laboratories are renovated, hoods are replaced with the reduced air flow units. Replacement of these hoods has reduced air exhausted from the laboratory by approximately 800 CFM. The estimated energy savings based on the use of these hoods, mostly from the energy needed to condition the replacement air, is approximately 920 MBTU per year and $19,800 per year in energy costs. An additional five fume hoods will be replaced under this program over the next two years, with an additional projected savings of 800 MBTU per year and $17,300 per year in energy costs.	
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	1	X				Energy Use	HVAC System		Energy & Water					HVAC contractors realigned the temperature settings for each chiller and adjusted the lead/lag on the older chiller. The pump out- put and the recirculation of the chilled water was also adjusted so both chillers would start/stop when needed. The controls for each chiller and these pumps were adjusted to allow this equipment to operate at peak performance. This modification of the pumps, chillers and controls has made for a more comfortable lab and not nearly the temperature variance that we had prior to this work. This modification has caused a savings of energy for the cooling system. Having the chillers and pumps only operating when needed provides energy savings for this repair.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other			
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	1	X				Energy Use	HVAC System		Energy & Water			1,000's Gallons of Water / Month		The NAREL HVAC system uses a cooling tower that cools the HVAC return water prior to the chillers cooling the water to the final temperature for use by the air handling units. When ambient temperatures are mild the additional cooling provided by the cooling tower is not required. When the return water is below a set temperature, typically during mild or cold weather, the cooling tower can be bypassed since the added cooling is not needed. A valve that performs this bypass feature was not working as required due to problems associated with incompatible control systems and a lack of understanding of how the system works by the maintenance contractor. During an operation and maintenance assessment conducted by OARM contractors and follow-up discussions with the maintenance contractor the valve and control system were repaired and the cooling tower bypass is now operating correctly.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	1	X				Energy Use	HVAC System		Energy			75% Savings over refrigeration A/C		Evaporative Coolers installed in new Secure ER Asset Building. Scheduled for occupancy in 2007.	Not clear whether percent savings refers to amount of energy consumed or cost. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	1	X				Energy Use	HVAC System		Energy					Use of programmable thermostats.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1	X		X	X	Energy Use	HVAC System		Energy	Approx. $180,000	FY 2006 24% Reduction from FY 2005			Maximizing the use of free cooling during shoulder seasons, reducing hot water loop temperatures and increasing chilled water temperatures, and actively promoting energy conservation by turning of test cell air handlers when not in use.	
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	1	X		X		Energy Use	HVAC System		Energy	$2,290 / Year	21,900 kWh / Year			Hot water coil pumps were programmed to stay off until the outside air temperature drops below 35°F or until the hot water coil valve starts to open. In addition, adequate freeze protection can be achieved by controlling the hot water valves to maintain a reasonable temperature, such as 60°F. The reduced unoccupied hot water flow will also result in pump energy savings.	Part of the recommissioning of energy using systems in EPA's portion of Building 25 on the Denver Federal Center, undertaken in 2006, in an effort to improve operation and efficiency. Operation of the energy consuming systems of the building was reviewed and improvement measures were developed, resulting in estimated cumulative energy and cost savings of $52,000

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OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	1	X		X		Energy Use	HVAC System		Energy	$3,400 / Year	32,600 kWh Electricity / Year			Non-laboratory Air Handling Units (AHUs) were shut down at the end of the occupied period (7 AM to 5 PM, weekdays) and typically restarted 2 hours prior to occupancy the next day. By delaying restart until 1 hour prior to occupancy, operation of each AHU fan was reduced by 350 hours per year saving 36,000 kWh and $3,760. The dock AHU ran continuously. These units are now shut down for 6,236 hours per year for fan energy savings of 32,600 kWh and $3,400.	Part of the recommissioning of energy using systems in EPA's portion of Building 25 on the Denver Federal Center, undertaken in 2006, in an effort to improve operation and efficiency. Operation of the energy consuming systems of the building was reviewed and improvement measures were developed, resulting in estimated cumulative energy and cost savings of $52,000.
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	1	X				Energy Use	HVAC System		Energy	$36,720 / Year	60,500 kWh / Year of electricity used for cooling; 2,800 Million BTUs of gas			Rebalancing of laboratory airflows and removal of unnecessary exhausts.	Part of the recommissioning of energy using systems in EPA's portion of Building 25 on the Denver Federal Center, undertaken in 2006, in an effort to improve operation and efficiency. Operation of the energy consuming systems of the building was reviewed and improvement measures were developed, resulting in estimated cumulative energy and cost savings of $52,000.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1	X				Energy Use	HVAC System		Energy					New Cooling Towers-2005. The original five cooling towers serving the facility were replaced with five new energy and water efficient cooling towers.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/Ecosystems Research Division - Athens, GA	1	X				Energy Use	HVAC System		Energy	Savings Not Yet Known				ERD has staff housed in six buildings. ERD will install programmable thermostats wherever feasible, and mandate temperature controls (target 70 F – 72 F) for all non-lab areas, where current ERD HVAC technology and work requirements permit.	
ORD/NERL/Ecosystems Research Division - Athens, GA	1	X				Energy Use	HVAC System		Energy, Water	Savings Not Yet Known				Increased Cooling Tower Efficiency. ERD replaced one cooling tower and upgraded another to increase cooling efficiency and reduce make-up water usage.	

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ORD/NERL/Environmental Sciences Division - Las Vegas, NV	1	X	X			Energy Use	HVAC System		Energy	$160,000 from 2004 to present; $480,000 Projected total savings from 2004-2011	575,000 kWh Electricity / Year; 30,900 Therms Natural Gas / Year			Several steps have been taken to increase the energy efficiency of the HVAC system by replacing outdated equipment. These steps include replacing: i) twenty-five outdated rooftop package HVAC units with units that have a Seasonal Energy Efficiency Rating (SEER) of 10 or higher; ii) a 15 ton, 25 year old chiller, rooftop air handler, and cooling tower with a 12 SEER rooftop 7.5 ton heat pump; iii) a 40 year old, 270 ton centrifugal chiller with a new high efficiency 270 ton reciprocal chiller; and iv) three, 40 year old, 2.4 mil BTU boilers with 3 new high efficiency 2.0 mil Btu boilers.	
ORD/NHEERL/Atlantic Ecology Division - Narragansett, RI	1	X				Energy Use	HVAC System		Energy	Annual Average $14,902*	Annual average 855 million BTUs (2.8 % / Year reduction)*			We have set our building automation system to accommodate for adjusting the non-occupied building temperatures from 6:00 PM to 6:00 AM. Heating and cooling are set at the Presidential standard of 68 degrees in the winter and 78 degrees in summer.	*These savings are averages based on annual data for FY99-FY06.
Region 10 - Manchester, WA	1	X				Energy Use	HVAC System		Energy					The Region 10 Laboratory no longer continuously runs the recirculation chiller for its ICP-MS. The vacuum pump on this instrument is not water-cooled, therefore, the chiller is now only turned on when the instrument is in use.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	1	X				Energy Use	HVAC System		Energy	Savings Not Yet Known				Many of the building-specific cost saving and efficiency gain efforts predate FY04. The actual dollars saved or BTU reduced has not been quantified. Among the efforts employed were to: Rescale boiler operations to run on low fire settings during spring and fall shoulder seasons. Lowered delivered steam pressure from designed 100psi to 50-60psi depending on the facility need.	

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Region 6 - Houston, TX	1	X		X		Energy Use	HVAC System		Energy	$4,000-$5,000 / Year				Facility operations and maintenance have implemented allowable temperature adjustments of equipment intended to reduce energy consumption without severely impacting space or comfort temperature. Some of these include: manual adjustment of HVAC thermostats to the lower settings of the winter building standard space temperature range, and upper settings of the summer range (i.e.: 69 deg. F. for the winter 68.5-74.5 range, and 77 for the 72.5 to 78 deg. F. range, give or take a degree or two); lower domestic hot water heater from 140 deg. F. to 123 deg. F., turning off equipment earlier where beneficial, reducing chiller equipment settings where possible.	
Region 7 - Kansas City, KS	1	X				Energy Use	HVAC System		Energy					The building was designed and built to be energy efficient. The use of variable air volume (VAV) technology in the heating, cooling and ventilation (HVAC) system and fumes hoods with operable sashes has resulted in significant energy efficiency over older constant flow systems. The extensive use of centrifugal fans and variable frequency drives also yields energy efficiencies. Additionally, the building is equipped with a heat recovery system which provides for the recovery of exhaust air heat as well as preheating of intake air as needed.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 8 - Golden, CO	1	X				Energy Use	HVAC System		Energy					Laboratory thermostats adjusted down in winter and up in the summer.	No quantification of savings. FURTHER INQUIRY NEEDED.
Region 9 - Richmond, CA	1	X				Energy Use	HVAC System		Energy		3.2 Million BTUs (23% Efficiency Gain / Boiler)			In FY 2005, the Region 9 Laboratory replaced an existing one 8 million BTU oversized boiler with two smaller 2.4 BTU boilers. The oversized boiler has an operating efficiency of 60% while the two replacement boilers have an overall efficiency of 83%. The new boilers provide additional hot water for building heat when the cogeneration waste heat is not sufficient.	

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OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	1		X			Energy Use	IT Infrastructure		Energy & Purchase					Several steps have been taken to reduced increase the energy efficiency of computer equipment, including: i) reviewing all IT hardware purchases for "greening" and requiring energy star compliance, at minimum; ii) replacing old CRTs with new energy star or better compliant monitors and recycling old CRTs; iii) reviewing the needs of actual users within the lab and replacing multiple computers with one computer (laptop) that can have multiple functions; and iv) using virtual computer software to enable users to have one physical computer that can access both lab networks. These measured have saved space, utility costs, and the expense of purchasing an additional 45 computers.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	1		X			Energy Use	IT Infrastructure		Energy	$1,000 / Year				NEIC was able to replace about 70% of the CRT monitors with the more energy efficient LCD monitors. The rest of the CRT monitors will be replaced as soon as possible.	
ORD/NERL/Environmental Sciences Division - Las Vegas, NV	1		X			Energy Use	IT Infrastructure		Energy	$1,600 from 2004 to present; $8,000 Projected total savings from 2004-2011	20,000 kWh Electricity / Year			Eighty-five CRT computer monitors were replaced with high efficiency flat screen LCD monitors.	
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1		X		X	Energy Use	Lab Equipment		Energy					Deactivated refrigerator and freezers which were not fully in use; and reconsolidated materials for refrigerated storage.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1		X		X	Energy Use	Lab Equipment		Energy					Instruments that are not actively used on projects are put in standby mode.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	1	X				Energy Use	Lighting		Energy					Use of Motion Detector Lighting switches in La Plaza Facility.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	1	X				Energy Use	Lighting		Energy	$1,180 / Year	11,300 kWh Electricity / Year			The EPA's atrium is adequately lit with natural light for most daylight hours. Much of the electric lighting in the area was turned off on a seasonal schedule or in response to a light level sensor.	Part of the recommissioning of energy using systems in EPA's portion of Building 25 on the Denver Federal Center, undertaken in 2006, in an effort to improve operation and efficiency. Operation of the energy consuming systems of the building was reviewed and improvement measures were developed, resulting in estimated cumulative energy and cost savings of $52,000.
ORD/NHEERL/Atlantic Ecology Division - Narragansett, RI	1	X				Energy Use	Lighting		Energy	$1,800 / Year	12,700 kWh / Year	20,780 lbs CO2 Emissions / Year		Reducing our lighting load both internally and externally has saved 12,700 kw per year, 20,780 lbs of CO2 emissions, and a cost saving of $1,800.	

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings					Description	Comments
		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1	X				Energy Use	Lighting		Energy	$180 / Year: Potential additional savings of $324 / Year	1500 kWh Electricity / Year; Potential additional savings of 2,700 kWh Electricity / Year			The Region 2 Laboratory has replaced lighting in areas that have been renovated with high efficiency lighting that provides light at a lower, but appropriate, level at the bench top. The lighting energy demand for renovated laboratories is approximately 30% less than the laboratories they replaced. The estimated savings for lights replaced to date is approximately 1500 kWh per year and $180. An additional three areas will be renovated under this program over the next two years, with an additional projected savings of 2,700 kWh per year and $324.	
Region 7 - Kansas City, KS	1	X				Energy Use	Lighting		Energy					The lighting in the building uses low energy use fixtures to the maximum extent. The lighting system is centrally controlled to turn off non-essential lighting either on a timed or light-sensor basis and numerous areas are controlled by motion sensors. This central control system is utilized to maximize energy efficiency.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 8 - Golden, CO	1	X				Energy Use	Lighting		Energy					Lights turned off in hallways and laboratories when natural lighting is sufficient or spaces are unoccupied.	No quantification of savings. FURTHER INQUIRY NEEDED.
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	1	X				Energy Use	Metering		Energy					To accurately measure overtime hour utilities usage and to ensure accurate billings, meters for electrical and chilled/hot water energy usage were installed. Because EPA shares space in Building 25 with other government agencies, GSA was billing on an estimated ratio, based on square footage, and billing overtime at a 100% to EPA. Meters now monitor electrical usage for the north switchgear to determine EPA's usage. Chilled water usage is monitored by separate BTU meters on piping serving EPA space. The building's automation system collects meter data for monthly processing. The meters have served to accurately calculate monthly billings for EPA.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1					Energy Use	Natural Gas System		Energy		420.34 MCF Gas			The ECL reduced Gas MCF from 1958.34 to 1538, a savings of 420.34 MCF.	No information was provided regarding how these savings were obtained. Also, it is not clear if these are annual or cumulative savings. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 9 - Richmond, CA	1	X				Energy Use	Natural Gas System		Energy	Savings Not Yet Known	Approx. 150 Million BTUs / Month			In FY 2005, a natural gas fired cogeneration unit was installed at the Region 9 Laboratory to produce electricity and hot water on site. An expected electrical reduction of 60kW (about 150 million BTU/month) is currently being achieved. Due to problems with the unit that caused it to be off more often than it was on in the first year of operation, the data necessary to determine cost savings is not yet available. It is now working correctly and cost savings data will become available in the future.	
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1	X				Energy Use	Power Factor Correction		Energy					Power Factor Correction-2005. Capacitor banks were installed at the T&E Facility to raise the power factor above 90% to avoid a penalty on the electric bill.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 9 - Richmond, CA	1		X			Energy Use	Refrigeration Units		Energy	Savings Not Yet Known				The Region 9 Laboratory has 4 walk-in coolers for sample storage. The refrigeration units for the coolers were replaced with more energy efficient units. Cost savings have not been tracked.	
OARM - RTP, NC	1	X				Energy Use	Space Utilization		Space	$220,000 in annual lease costs				We eliminated two back warehouses from our Page Road Grand Slam facility in 2007. The move reduced our overall warehouse square footage from 38,000 sq ft to roughly 18,000 sq ft. The move is estimated to save the EPA approximately $220,000 in annual lease costs.	
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1					Energy Use	Space Utilization		Space	$5,000				The ECL reduced occupancy charges from $170K to $165K, a savings of $5K.	No information was provided regarding how these savings were obtained. Also, it is not clear if these are annual or cumulative savings. FURTHER INQUIRY NEEDED.
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1	X				Energy Use	Space Utilization		Energy	$8,500 / Year				The NRMRL/UWMB Laboratory contractor has been moved from various inefficient trailers to consolidated modern space in 2005. This move has eliminated the energy loads from six inefficient trailers. Energy savings from the elimination of the trailers is offset by the new loads in the modular building and modern laboratory trailer complex that replaced them. The new buildings represent a significant expansion in the capabilities and amenities offered to the occupants. The observed savings from this program is $8,500 per year in energy costs.	

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1	X				Energy Use	Space Utilization		Energy	$13,500 / Year	600 Million BTUs / Year			The OSWER training contractor has been moved from various locations on the facility to consolidated modern space in 2005. This work has eliminated energy loads in Bay F of Building 209 and Bays C and D of Building 205. Energy savings in these areas are offset by new loads in Building 238. The design and construction of Building 238 incorporated energy efficient design strategies including use of natural light, insulated ceiling deck, variable volume HVAC systems and efficient boilers and chillers. The estimated savings from this work is approximately 600 MBTU per year and $13,500.	
Region 6 - Houston, TX	1	X				Energy Use	Uninterrupted Power Supply (UPS)		Energy	Approx. $5,450. 67 / Year				MGE Galaxy PW electronic/solid state "static transfer" system virtually operates with a very minimal load in comparison to the old Powerbloc motor/generator (M/G) UPS system installed at R6 lab. The old system would consume between 60 to 70 continuous amps of 3 phase voltage to run the M/G. New system of latest technology.	
Region 9 - Richmond, CA	1	X				Energy Use	Uninterrupted Power Supply (UPS)		Energy		23% Reduction in kWh Usage			In FY 2007, the Region 9 Laboratory replaced the existing 225- KVA Uninterrupted Power Supply (UPS) with a new 80-KVA UPS. It was estimated that the new UPS system would use 50% less power than the existing UPS. The first month after installation showed a 23% percent reduction in kWh usage.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	1		X			Energy Use	Vehicle Fleet		Fuel					Over the last several years, the Lab has been moving to more fuel efficient vehicles. Hybrid Ford Escape replaced full size pickup truck / large van based truck. Chrysler flexible fuel minivan replaced full size van. Employees are encouraged to limit trips, combine errands and use the most fuel efficient vehicles available at that time for trips.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1		X			Energy Use	Vehicle Fleet		Fuel & Maintenance					Reduction in GSA fleet from 4 to 3 vehicles. This current fleet includes a Toyota Prius, an E-85 minivan, and an E-85 compact sedan.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 10 - Manchester, WA	1		X			Energy Use	Vehicle Fleet		Fuel & Maintenance	$4373.52 / Year				One of two leased government owned vehicles (GOVs) was returned to the Government Services Administration since both were rarely used at the same time. If there is a need for a second GOV at the Laboratory on any given day, arrangements will be made with the Office of Environmental Assessment or the Office of Policy and Management to obtain an additional GOV to meet that need.	
Region 8 - Golden, CO	1		X			Energy Use	Vehicle Fleet		Fuel					Utilization of E85 and hybrid vehicles.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	1	X		X		Energy Use	Water System		Energy	$3,200 / Year (Due to control modifications to secondary condenser pumps & cooling towers); $1,430 / Year (Due to controlling pump to operate only when condenser system active)	30,600 kWh Electricity / Year (Due to control modifications to secondary condenser pumps & cooling towers); 13,700 kWh Electricity / Year (Due to controlling pump to operate only when condenser system active)			To achieve more efficient cooling tower operation, the multiple fans operating in parallel were modulated in speed to achieve the required condenser water set point. Additional modifications were made to the bypass valve allowing fan modulation down to minimum speed and cycling them off as necessary. Savings for these control modifications to the secondary condenser water pumps and the cooling towers are predicted to total 30,600 kWh and $3,200 per year. Controlling the pump to operate only when the condenser water system is active will save EPA an estimated 13,700 kWh and $1,430 annually. Other modifications to the chillers allowing shutdown sooner will provide some modest energy savings.	Part of the recommissioning of energy using systems in EPA's portion of Building 25 on the Denver Federal Center, undertaken in 2006, in an effort to improve operation and efficiency. Operation of the energy consuming systems of the building was reviewed and improvement measures were developed, resulting in estimated cumulative energy and cost savings of $52,000.
ORD/NHEERL/Atlantic Ecology Division - Narragansett, RI	1	X				Energy Use	Water System		Energy, Water, & Cost of Utilities	$32,000 / Year (payback period <8 years)	293,000 kWh Electricity / Year (20% reduction)	1,000,000 Gallons of Water / Year		In Narragansett, we re-commissioned our chilled water plant in 2004 at a cost of $250,000. The projected pay back period is less than 8 years with a realized annual cost reduction of $32,000 (293,000 kw). When the chilled water plant is in operation, it is 20% more efficient than when it was originally installed in 2001. With the chiller re-commissioning, we save 400,000 gallons of potable water per year. Couple that with the reduction of single pass cooling equipment this past summer, we reduced our annual potable water consumption by a total of 1,000,000 gallons per year.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	2		X	X		Energy Use	Alternative Energy Sources	DOE, UL Co-operative Program	Fuel	$250,000 over next year				NVFEL is beginning an E-85 dispenser-testing program intended to facilitate the introduction of E-85 in the marketplace. This program was originally intended for implementation at the Oak Ridge Laboratory, but the necessary safety equipment was unavailable in that location.	

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		F	E	P	A					$	Energy	Other			
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	2	X				Energy Use	Building & Facilities		Energy					Facilities Management Services Division's Sustainable Facilities Practices Branch (SFPB) will be sending a building controls expert to look at the programming at the NVFEL, to provide improvement in operation and reduction in energy use.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OARM - RTP, NC	2	X				Energy Use	Building & Facilities		Energy					RTP energy projects. The following projects are either in process or schedule through the B&F process for future years: i) Human Studies AHU 2 (2007) 1.4M; ii) Human Studies AHU 1 (2008) 1.2M; iii) controls master plan (phase 3/4 – 2008/2009) 550K each year; iv) OCRA (phase 2 – 2008) 550k; v) High Bay commissioning (2009) 250k; vi) sub metering (main campus – 2008) 400k; vii) sub metering (HBB – 2008) 138k; viii) install PV laminate panels on Child Care Center roof (2008) 750k – 1.3M; ix) VAV valve upgrade (bldg B, HBB) 600k/1.5M; x) HBB rain water harvesting at HBB & CUP (2009) 120k; xi) water reclamation (design 2009) 100k; and xii) water reclamation (construction 2010) 1.7M.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OARM - RTP, NC	2	X				Energy Use	Building & Facilities	National Institute of Environmental Health Services	Energy					RTP shares a utility plant with the National Institute of Environmental Health Services (NIEHS). This plant provides both agencies with the chilled water, high temperature hot water, gas, and electric to operate our facilities form day to day. We have identified the following B&F projects in support of the CUP over the next few years: i) CUP Chilled Water System Optimization (design - 2007) 50k estimate; ii) CUP Chilled Water System Optimization (construction phase 1-2008) 250k estimate; iii) Main Campus water-side commissioning (2008) 150k; iv) CUP improvements (2009) 500k; and v) CUP Chilled Water System Optimization (phase 2-2009) 250k estimate; vi) CUP improvements (2010) 500k.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	2	X				Energy Use	Building & Facilities		Energy					AWBERC Infrastructure Replacement Project-2008-2014. The AWBERC IRP will result in numerous energy efficiency gains for the facility this include: variable flow heating hot water pumps; air side & water side economizers; supply air static pressure reset glycol run around energy recovery system; improved heating/cooling setback capabilities; heating supply air temp. reset; variable flow air supply fans; variable flow lab exhaust air system; high efficiency Fume Hoods / Ventilation; and automatic fume hood sash positioning system. These features will permit the entire AWBERC lab to operate at much more efficient energy levels.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL/Atlantic Ecology Division - Narragansett, RI	2	X				Energy Use	Building & Facilities		Energy		25% Reduction			The Narragansett Lab's Chemistry Wing is slated for a major mechanical and lab systems overhaul from 2008 -2012. The utility cost-savings are calculated to approach 25% through improved efficiencies in motors, air handlers and Fume Hoods / Ventilation.	
ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	2	X				Energy Use	Building & Facilities		Energy					New GIS/IT Building under construction under the LEED Program (Gold Standard). Once completed, two adjacent, less efficient, buildings will be removed.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 10 - Manchester, WA	2	X	X			Energy Use	Building & Facilities		Energy					PVC strips will be installed in the other three constant temperature rooms to reduce the energy demands associated with temperature fluctuations during use. Energy use before and after PVC strip installation is currently being measured in the first constant temperature room.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	2	X				Energy Use	Building & Facilities		Energy	$17,300 / Year	800 Million BTUs			The Region 2 Laboratory renovation project is ongoing. In the next three years, an additional five Fume Hoods / Ventilation will be replaced with hoods that reduce air flow by approximately 25% while maintaining adequate chemical capture and user safety. Lighting will also be renovated with energy efficient fixtures that provide a lower level of artificial light and take advantage of natural lighting. Over the next three years there will be an additional projected savings of 800 MBTU per year and $17,300 per year in energy costs.	
Region 5 - Chicago, IL	2	X				Energy Use	Building & Facilities		Energy					Increase in usable space in organic and metals labs (for same rent) and reduction of electricity usage for lighting, Fume Hoods / Ventilation, and HVAC as part of next phase of lab renovations.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 5 - Chicago, IL	2	X				Energy Use	Building & Facilities		Contractor Space	$66,000 / Year		2,200 sq. feet		Reduction of office space square footage for ESAT contractor staff as part of next phase of lab renovations.	
ORD/NRMRL/Ground Water & Ecosystems Restoration Division - Ada, OK	2			X		Energy Use	Employee Behavior		Energy	Savings Not Yet Known				The Director will initiate a policy for all employees at the facility to turn off lights when not in use, shut down personal computers at the end of the day and on days off, and shut down all instrumentation that can operate under shut down/start up conditions at the end of the work day or on days when not in use. It is not known the exact amount of power savings this will accomplish, but it is expected to be significant and will be monitored for the first six months of its operation.	
Region 6 - Houston, TX	2		X	X		Energy Use	Employee Behavior		Energy	Savings Not Yet Known				Currently Lab Management and Team Leaders are examining which, if any, additional instrumentation and equipment may be shut off during non working periods. Once equipment is identified a cost reduction estimate will be completed.	
Region 6 - Houston, TX	2		X	X		Energy Use	Employee Behavior		Energy	$3,000-$5,000 / Year				Shutdown of various constant volume Fume Hoods / Ventilation, air exchangers, and exhaust fans in the building with proper Laboratory management and building maintenance coordination. Ongoing effort to identify and coordinate non mission essential/critical HVAC systems until more efficient system replacements are installed.	
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	2			X	X	Energy Use	EMS		Energy					NEIC has developed an EMS that will be implemented over the next several years and more fully developed in subsequent years. NEIC's EMS has initially set objectives and targets for three selected significant environmental aspects (SEA): paper consumption, energy consumption and waste generation. Based on a conservative goal of a 5% reduction for these SEAs compared to 2006 baselines, there should be significant cost savings and efficiency gains to NEIC. 2006 baselines are presently being compiled, which will allow for the estimation of cost savings. Further savings through FY 2010 will be determined through an evaluation of progress made during 2007, and through the use of this data, based on projections for the future. As opportunities arise, new SEAs will be identified and objectives and targets set which will result in additional cost savings and efficiency gains.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	2		X			Energy Use	EMS		Energy	$2,200 / Year	10% Reduction			The Region 2 Laboratory is in the process of replacing over 20 old laboratory refrigerators with EPA Energy Star rated refrigerators. Based on data collected by the Laboratory, the current energy use for the refrigerators, on an annual basis, is approximately 50,000 kW-hrs. This translates into a cost of $6000 per year. By purchasing Energy Star rated units, the Laboratory anticipates averaging only 32,000 Kw-hrs per year, for a cost savings of approximately $2200 per year using current energy costs. In addition, the streamlined design of the 24 new refrigerators will be reducing the total refrigerator footprint by 10%; and since the new units will be purchased with casters, facility contractor staff will have easier access for refrigerator maintenance.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	2	X	X	X	X	Energy Use	EPAct of 2005		Energy					Aggressively pursuing additional energy reductions outlined in the Energy Policy Act (EPAct) of 2005.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	2	X				Energy Use	Fume Hoods / Ventilation		Energy					As part of planned R&IE analytical lab replacement project, R&IE will replace current hoods and laboratory ventilation systems that do not meet current safety or energy efficiency standards. Replacement of these hoods offer the opportunity to achieve energy savings by reducing the amount of air that needs to be conditioned depending upon usage.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	2	X				Energy Use	Fume Hoods / Ventilation		Energy					Install variable flow Fume Hoods / Ventilation in an area that is being modified as a sample preparation laboratory.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 10 - Manchester, WA	2	X				Energy Use	Fume Hoods / Ventilation		Energy					The Laboratory will continue to replace its older hoods with variable air volume models during renovations. Laboratory staff is also working with EPA's Safety, Health and Environmental Management Division and the building automation system contractor to investigate reducing the number of air exchanges/hour in unoccupied laboratories from eight to four (e.g., during weekends and evenings) to reduce energy demand.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	2	X				Energy Use	Fume Hoods / Ventilation		Energy					Laboratory Control Optimization Project (LCOP). The project to tighten controls of laboratory functions to reduce air demands in the labs when they are unoccupied. Install room sensors to determine whether room is occupied and to reduce air exchanges to minimum levels even during periods that would normally considered occupied. Tighten supply and exhaust controls to modulate room conditions.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	2	X				Energy Use	HVAC System		Energy, Water, & Cost of Utilities	Savings Not Yet Known				OARM has initiated a project to replace and upgrade the chillers, cooling tower and associated control systems at NAREL. This project will save energy, water and provide a more consistent HVAC system for the facility. At the same time a new Emergency Response Warehouse will be constructed at NAREL during FY07. During the design stage of both of these projects it was determined the projects could be coordinated and the chilled and boiler water from the main facility could be used to heat and cool the new warehouse. This coordination eliminates the need for chillers and boilers in the new warehouse with minimal cost to connect to the main lab.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	2	X				Energy Use	HVAC System		Energy					During computer room expansion and renovation, the outdated and inefficient air conditioners will be replaced with state of the art hot aisle/cold aisle design that will use the energy efficient central plant for service.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	2	X				Energy Use	HVAC System		Energy	$1,400	800 CCF Natural Gas			The two boilers of Building 209, which houses the Region 2 Laboratory and office space, are scheduled for replacement before the 2007/8 heating season. The boilers to be installed will be more efficient and will allow one boiler to be shut down in most operating conditions. This process is in design, so final consumption figures are not available at this time. Estimated savings from this program are 800 ccf of Natural Gas at a cost of $1,400.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	2	X				Energy Use	HVAC System		Energy					Adjust steam reducing stations from 15 psi to 5-7 psi operation. A lower steam pressure needed by equipment reduces boiler demand and load further.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	2	X				Energy Use	HVAC System		Energy					Currently the cooling tower fans are two speed motors which react to the condenser water temp. By placing the units on VFDs we expect to reduce motor electrical demands to an appropriate level. As a temporary fix to the two speed motor problem, we operate multiple fans at low speed in the manual mode. The original design had one cooling tower per chiller. Thus in the past if extra cooling was required, an additional chiller would come on in order to turn on another tower. Now we have multiple towers come on for one chiller.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings				Reinvestment of Savings	Description	Comments
		F	E	P	A				Type	$	Energy	Other			
Region 4 - Athens, GA	2			X		Energy Use	HVAC System		Energy	$30,000 / Year				An energy management plan has been proposed to automatically reset the temperature of the building back at night and weekends. Other efficiencies are proposed and under consideration. SESD and HQ are working on implementing the plan. It has been estimated that the proposed energy saving actions could save approximately $30,000/yr in energy costs.	
Region 6 - Houston, TX	2	X			X	Energy Use	HVAC System		Energy					Establish a PO/contract for an "Engineering & Operational Methodology Study" (Engineering & HVAC Specialist) through the Regional Facilities Branch. The study would examine the feasibility, return on investment, and safety and health impact of HVAC modification and other cost reduction items outlined in this memo. Staff input on the targets identified in this memo as well as additional ideas are encouraged from all building occupants. Estimated one time cost $2,500.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	2		X			Energy Use	IT Infrastructure		Purchase & Maintenance	$136,000 in hardware every three years and $25,000 in Software & Services / Year				Using docking stations, IT users that now have both desktop and laptop computers will receive one integrated laptop solution.	
Region 4 - Athens, GA	2		X			Energy Use	Lab Equipment		Operations & Maintenance	$12,000				Mercury Analyzer. A business model was used to evaluate the cost/benefits, both economic and environmental, of acquiring a new mercury analyzer. The results were significant, with estimated savings in operational costs of $12,000.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	2	X				Energy Use	Lighting		Energy					Installation of a completely new exterior lighting system using state of the art, energy efficient technology. Reducing the total number of fixtures while providing more light with less energy.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/Ecosystems Research Division - Athens, GA	2	X				Energy Use	Lighting		Energy	$5173 / Year				ERD plans to retrofit existing T12 lamps and magnetic ballasts to T8 lamps and electronic ballasts; replace existing incandescent exit signs with LED exit signs; and install motion sensors in offices and laboratories to automatically shut off lights when room is unoccupied.	
ORD/NERL/Environmental Sciences Division - Las Vegas, NV	2	X				Energy Use	Lighting		Energy	$38,400 Projected total cost savings from 2004-2011	119,200 kWh Electricity / Year			There are 1200, 40-year-old lighting fixtures and 4000 F40-T12 and F32-T8 lamps scheduled to be replaced with new high efficiency "green" fixtures that have electronic ballasts.	

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
ORD/NRMRL/Ground Water & Ecosystems Restoration Division - Ada, OK	2	X				Energy Use	Lighting		Energy	$240 / Year (payback period approx. 10 Years)	3,900 kWh Electricity / Year			RSKERC plans to execute a pilot project to install motion sensing light switches in selected areas throughout the lab starting with offices where direct line of sight sensors are effective. Phase I will install 28 sensors at an estimated cost of $2300. Annual energy savings is estimated at 3900 KWH. The annual cost savings of the project is estimated to be $240, giving a payback period of approximately 10 years.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	2	X				Energy Use	Metering		Energy					Using facility sub metering to be installed by SFPB as required in the Energy Policy Act, NVFEL will better understand where all energy is used in the facility, and how it may be reduced.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 7 - Kansas City, KS	2	X				Energy Use	Operations & Maintenance		Energy					An evaluation of the operation and maintenance of the RSTC was completed recently by contractors from the Sustainability Branch (OARM) in EPA HQs. The focus of the evaluation was on energy use and we anticipate that the resulting report will be beneficial in identifying further changes that will reduce energy use in the facility. Dependent upon the availability of funding, we will pursue the implementation of operational changes to enhance the efficiency of the HVAC system and reduce energy consumption.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 10 - Manchester, WA	2	X	X			Energy Use	Power Sags		Operations & Maintenance	Approx. $2,800 Parts & Labor / Sag				The Laboratory installed software to investigate power sags at the facility. With this information, Laboratory management held a meeting with the utility company. As a result of this meeting, the utility is now addressing the chronic power sag issues.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	2		X			Energy Use	Space Utilization		Purchase & Labor	$30,000 in equipment purchases; $50,000 in auditing costs				R&IE will be acquiring a trailer formerly used by Region 7 in conducting Performance Evaluation Program audits and Through the Probe audits. The R&IE TAMS Center will configure this to perform audits on tribal lands as well as being used as a training platform for tribal air monitoring staff. This trailer will enable the tribes to cross-audit rather than using external contractors.	

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
ORD/NHEERL/Western Ecology Division - Corvallis, OR	2	X				Energy Use	Space Utilization		Contractor Space					In 2011, the Jefferson Street Building (JSB) lease is due to expire. This lease is paid from EPA-HQ, OARM, at an annual cost of $400K. Under the current master plan, it is the intention of the Agency to reduce reliance upon leased holdings. In order to mitigate any potential cost increases due to contractors who are housed in JSB, the Division has opted to retain two trailers that had previously been scheduled for demolition. This will allow the division to retain the flexibility of continuing to provide space to the on-site contractors, thus keeping the overall costs lower for contract services.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 10 - Manchester, WA	2	X				Energy Use	Space Utilization		Energy	$750 / Year				The Region 10 Laboratory campus comprises a number of buildings, one of which is an old house trailer used as office space for three field employees. This trailer could be closed and the occupants moved to another building which houses ESAT contract staff. Because of the drop in the number of ESAT contract staff over the years, this larger building has room to accommodate more staff. These field staff do not work with the ESAT contractors, and there would be no conflict of interest. Estimated cost savings presented by no longer heating, cooling and lighting the 300 square foot trailer equate to $750 per year.	This item describes moving the office locations of three EPA staff field employees from their current location to the ESAT (contractor) office building. It turns out that there isn't enough room in the ESAT building for this staff as more contractors have moved into it recently. There are also issues with the lack of having enough separation from the contractor staff offices in concern of EPA sensitive materials and communications involved with these field employees who perform criminal investigations and inspections. As a result, this suggestion is no longer being pursued.
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	2	X				Energy Use	Space Utilization		Energy	$80,000 / Year				The office function of OSWER/ERT contractor is currently housed in a complex of 40 trailers. It is proposed to relocate this function to space in Building 205 Bay C, along with the ERT office functions. The proposed space will incorporate energy efficient features, including Green Lights, the use of natural light, improved insulation, and energy efficient variable volume HVAC systems. Estimated energy savings from this relocation are expected to be $80,000 a year.	

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	2	X				Energy Use	Space Utilization		Energy	$3,000 / Year	120 Million BTUs			The office functions of OSWER ERT are housed in Building 18. Building 18 is inefficient, with inadequate insulation, electric resistive heating and window-box air conditioners. It is proposed to relocate this function to space in Building 205 Bay C, along with the ERT contractor office functions. Estimated savings from this program are 120 MBTU per year and $3,000.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	2		X			Energy Use	Steam Generation		Energy					Clean steam generator monitoring switch to turn generator on or off automatically when there is or is not a need for humidity in the facility. Currently, the setting requires a manual turn off and thus this small unit gets overlooked when the demand is not needed.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	2		X			Energy Use	Vehicle Fleet		Fuel & Maintenance					Currently we have four GSA vehicles at NAREL. Three (Olds Alero, Chevy Van and Chevy Suburban) are used for employee official travel and Emergency Response activities. The fourth is a Chevy S-10 pickup used by NAREL maintenance and can be used for Emergency Response activities. The S-10 pickup is a E-85 vehicle. The Olds Alero will be replaced later this year by GSA. We have requested an E-85 sedan as a replacement for the Alero. When more E-85 fuel locations are built in Alabama, these vehicles will save money for EPA and valuable petroleum for the nation. The suburban is scheduled for replacement in FY 2008. We will review the list of E-85 vehicles offered in this vehicle category prior to making our replacement request for FY 2008.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL/Atlantic Ecology Division - Narragansett, RI	3	X				Energy Use	Alternative Energy Sources		Energy					Our coastal location could be compatible with wind power generation, and this is something we would like to consider as a pilot program if funds were available.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/Ecosystems Research Division - Athens, GA	3	X				Energy Use	Building & Facilities		Energy					FY10—Master Plan Phase 2B. Renovate existing offices and replace existing HVAC with VAV System, and Replace windows: This project will provide improved energy use for heating and cooling, and will provide energy efficient windows.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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ORD/NERL/Ecosystems Research Division - Athens, GA	3	X				Energy Use	Building & Facilities		Energy, Equipment, Maintenance, Contract	$147,000 / Year (projected maximum savings dependent on option exercised)				Lifespan Daycare Center. Consider options for cost-sharing/savings of operation and maintenance and other costs. ERD provides the following costs per year for operation of the daycare center: utilities $11,000, supplies and equipment $4,000, operation and maintenance (approximately 10% of the contract cost) $100,000, SEE support of the contract $1,000, Contract Officer Representative's time overseeing the contract, $6,000 , repairs and improvements, $25,000. Total expenditure - $147,000. Options include: i) continue to operate daycare as is; ii) have the Athens Montessori pay O&M costs, utilities, R&I, and for S&E; iii) have the user federal agencies pay for all or a major part of the daycare operating costs starting in FY08; iv) transfer daycare operations to USDA the largest user of the facility; v) use as R4/SESD Field Equipment Center ; vi) close daycare facility; and vii) combinations of the previous options.	
ORD/NHEERL - RTP, NC	3	X				Energy Use	Building & Facilities		Space	Potential savings to include cost of RTP lease ($1.7M), utilities (>$0.7M), and security costs ($0.2M)				The Reproductive Toxicology Facility (RTF) is a GSA leased facility which contains research laboratories, animal care facilities and offices. The RTF is separated from the EPA RTP main campus by approximately two miles, and the main tenant is NHEERL's Reproductive Toxicology Division (RTD). There is a potential substantial savings if the RTF operations can be moved to the main campus. The RTF has a very high energy consumption, due largely to the one-pass air ventilation system for the entire building. All of the projected savings would be in items paid for by OARM. The present lease expires in November 2014.	OARM has recently initiated the development of an RTP Master Plan. One of the issues for this plan to consider, is options to consolidate the RTF operations to the main campus. While the feasibility of consolidation has not been determined, it seems reasonable to believe that it could not occur without modifications and perhaps construction on the main campus. The extent of these modifications is unknown, but the one-time cost would offset some of the savings of the lease termination.
ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	3	X				Energy Use	Building & Facilities		Energy					Window tinting can conserve energy for cooling buildings by reducing the quality and quantity of light entering through the windows. Windows to receive tinting as time and finances allow.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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ORD/NHEERL/Western Ecology Division - Corvallis, OR	3	X				Energy Use	Building & Facilities		Energy					WED has requested $3.85M in FY08 and FY09 for design and upgrades to the mechanical and electrical systems, penthouse modifications, new exhaust fans and air handlers which would result in operational cost savings and energy efficiencies to the agency. Although they have been officially entered into the agency SLATE system, they will not be officially scheduled until funded.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 1 - Chelmsford, MA	3	X				Energy Use	Building & Facilities		Energy	Savings Not Yet Known				The Laboratory has plans to achieve further energy savings. In March 2007, the Laboratory embarked upon a feasibility study to site a wind, solar or geothermal generation project at the laboratory.	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	3	X				Energy Use	Building & Facilities		Energy	$170,000	8,000 Million BTUs			The Region 2 Laboratory requires rebalancing and recommissioning. The air handler for Bay D is obsolete and requires replacement and the air handler for Bay C will require reconfiguration or may require replacement. Estimated construction cost for this project is approximately $920,000. This project will permit the use of reduced air flows in the Laboratory, particularly during periods when the building is unoccupied. Estimated savings from this program are 8,000 MBTU per year and $170,000.	
Region 4 AND ORD/NERL/ Ecosystems Research Division - Athens, GA	3	X				Energy Use	Building & Facilities							Presently the R4/SESD COOP site is the Regional Field Equipment Center (FEC), which could only serve as a meeting place, but is unacceptable for essential personnel to work. ORD/ERD is presently preparing the use of the ORD Bailey Rd facility as their COOP site. Making the necessary upgrades to potentially enable the Bailey Rd facility to serve as the COOP site for both ORD/ERD and R4/SESD, either individually or concurrently, would be advantageous to both organizations.	Type of savings not specified and no quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	3	X				Energy Use	Building & Facilities		Energy		1,041,042 kWh Electricity / Year (based on 34K sq')			Examine cost benefits of installation of a "White Sun Shield" roof coating over existing roof material.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	3	X		X		Energy Use	Fume Hoods / Ventilation		Energy	Savings Not Yet Known				Currently, test cells at NVFEL are ventilated with 10 fresh air changes per hour. Since the EPA requirement for lab space is 8 air changes per hour, the feasibility of reducing air in test cells will be considered. Savings associated with this change are not yet known.	

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Region 6 - Houston, TX	3	X				Energy Use	Fume Hoods / Ventilation		Energy		5% Reduction			Currently laboratory hoods are calibrated at 100+ fps per original lease requirements. SHEMD guidelines (and OSHA) require minimum settings between 80-120 fps per hood. Recommend that fume hood be calibrated at 90 fps (complying with EPA/OSHA requirements). Implementation cost between $4-5K (one time charge to replace pulleys, belts, labor). Return on investment (ROI) less than 1-year. Barrier is funding, funding program(s) or incentives.	
Region 9 - Richmond, CA	3	X				Energy Use	Fume Hoods / Ventilation		Energy					There are approximately 3 old biosafety cabinets at the Region 9 Laboratory that may not meet NSF 49 criteria for certification. Two of the BSC are not used and could be removed. The remaining BSC could be replaced with a BSC of the appropriate class and type. In addition, a recent survey of the Region 9 Laboratory found nine ventilated shelving units. The chemicals and supplies in these shelving units could be relocated and the exhaust on these units could be turned off to reduce flow. Furthermore, chemical fume hoods that are used on an infrequent basis could be removed or hibernated.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	3	X				Energy Use	HVAC System		Energy					Examine cost benefits of installation of AC control for Laboratory area.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 9 - Richmond, CA	3			X		Energy Use	HVAC System		Energy	Savings Not Yet Known				The Region 9 Laboratory is exploring the feasibility of turning off the air handler that supplies the laboratory block of the building at night and on weekends that the laboratory is not in use. Currently the other air handler supplying the administrative area is turned off each night and on weekends. There may be some technological hurdles to overcome and SHEMP would have to approve of the practice.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	3		X			Energy Use	IT Infrastructure		Energy					Replace all large scale servers with next generation multi-core processors that require less energy to operate, and give off less heat, thereby reducing cooling costs for server rooms.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	3	X				Energy Use	Lighting		Energy					Need to consider Emergency/ After Hours LED lighting system with photocell and battery storage. Perform energy use study of existing NAREL after hour usage and perform market research on changing lighting.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
ORD/NRMRL/Ground Water & Ecosystems Restoration Division - Ada, OK	3	X				Energy Use	Lighting		Energy	$1900 / Year (payback period approx. 10 years)	Approx. 31,000 kWh Electricity / Year (approx. 1% total annual kWh consumption of lab)			A Green Lights project completed in 1993 replaced 77% of the T12 lights. RSKERC plans to replace the remaining 714 T12 bulbs (23%) within the next year. Total project cost is estimated at $19,000, resulting in an approximately 10-year payback.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	3	X				Energy Use	Lighting		Energy					Daylight sensors to turn on/off hall lights to reduce energy demand for common areas.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL/Atlantic Ecology Division - Narragansett, RI	3	X				Energy Use	Natural Gas System		Energy					We have recently had our natural gas delivery line upgraded to handle an increase in pressure. This increase could support a "Cogeneration Plant" of heat, electricity and cooling.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 9 - Richmond, CA	3			X	X	Energy Use	Pressurization & Flow Audit		Energy	Savings Not Yet Known				The Region 9 Laboratory could perform a laboratory pressurization and flow audit to develop optimum flow specifications for the lab. Data from such an audit may identify opportunities to reduce flow which may result in energy cost savings.	
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	3		X			Energy Use	Vehicle Fleet		Fuel & Maintenance					Need to perform cost benefit analyses of purchasing vehicles to replace the GSA Van, Suburban, and Oldsmobile to determine cost savings and recovery period for either gas and/or hybrid vehicles. Utilize GSA lease and purchase schedules and NAREL vehicle use records to perform cost benefit analysis based on NAREL needs and requirements.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	3		X			Energy Use	Vehicle Fleet		Fuel					Additional steps could be take to Improve vehicle fleet efficiency and reduce overall fleet size and emissions including, i) reducing the number vehicles (relative to mission requirements); ii) replacing existing fleet vehicles with more energy efficient models as they reach their GSA replacement schedule; and iii) installing diesel retrofit technology on applicable vehicles.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	3		X			Energy Use	Vehicle Fleet		Fuel					Replace the current GSA vehicle with an GSA E85 capable vehicle to take advantage of the alternative fuel available on this NASA facility.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/Ecosystems Research Division - Athens, GA	3		X			Energy Use	Vehicle Fleet		Fuel & Maintenance	$3700 / Year				Reduce GOV fleet by one field vehicle. There are currently three field vehicles. A survey is being conducted to determine if ERD could efficiently operate its field study programs with two field vehicles.	

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		F	E	P	A				Type	$	Energy	Other			
Region 4 - Athens, GA	3		X			Energy Use	Vehicle Fleet		Fuel & Maintenance	$3,975				Reducing the transportation fleet. Savings could be realized by eliminating under-used field vehicles. EPA 760 (step van) transferred from ILS. Reason for Surplus: Has not been used for field work in over 1 year. Needs repairs. Old model.....1987. It would cost approximately $975 to make this GOV roadworthy. It should be surplused. EPA 1327 (drill rig) transferred from ORD. Reason for Surplus: Not used in SESD field activities. Some parts may have been removed, but vehicle does not go out as a working unit. Ensure EPA 862 (drill rig) transferred from Region 7 is donated as planned. Vehicle has been weighed and evaluated for shipment. The two drill rigs (EPA 1327 and 862) should be surplused, there are no plans to take them to the field. If it was planned to use them it would cost approximately $1500 each.	
Region 4 AND ORD/NERL/ Ecosystems Research Division - Athens, GA	3		X		X	Energy Use	Vehicle Fleet		Labor	$4,680 / Year				Presently, the R4/SESD and ORD/ ERD fleet of vehicles are managed separately by two GS-9 EPA fleet managers. The SESD fleet consists of 41 vehicles (26 GSA leased and 15 EPA owned). The ERD fleet consists of 7 vehicles (6 GSA leased and 1 EPA owned). Combining these fleets would require working through a number of procedural issues, including billing costs, combined reservation system, priority of reservations, etc. There is a substantial amount of data input required in the management of these vehicles (estimated 260 hrs/yr). The cost of this data input is about $6,760/yr. By utilizing an existing SEE employee at ERD, this cost of data input would be reduced to $2,080/yr, realizing an annual savings of $4,680/yr.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	4	X				Energy Use	Alternative Energy Sources		Energy					Consistent with Executive Order 13148, the laboratory has developed a proposal and plan to install photo-voltaic (solar electric) cells on government vehicle parking canopies to generate electricity to offset the energy usage on our newly built secure ER facility -providing funding is made available. Barrier: OARM / FMSD Funding.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	4	X				Energy Use	Alternative Energy Sources		Energy					Installation of Solar Panels (T&E, Center Hill Facilities). The idea of installation solar panels at these two facilities to generate power for hot water & lighting has been discussed. Barrier: at this point in time the payback period does not make this cost effective.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	4	X				Energy Use	Alternative Energy Sources		Energy					Solar panels for backup electrical needs, auxiliary lighting, parking lot lights, and assisting hot water production. Barrier: Payback period for a system is cost prohibitive. Survey paid by OARM.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 7 - Kansas City, KS	4	X				Energy Use	Alternative Energy Sources		Energy					Consideration of feasible alternatives to traditional energy sources including on-site alternatives such as wind generation. Barriers: Cost, esthetics, lease restrictions and local ordinances may be barriers to actually being able to pursue alternative sources of energy.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 9 - Richmond, CA	4	X				Energy Use	Alternative Energy Sources		Energy	$38,072 for thirty years (payback period approx. 16 years)				Wareham Development, Inc., landlord for the Region 9 Laboratory facility has preliminarily explored the possibility of installing a photovoltaic system on the roof of the Region 9 Laboratory. One quote obtained by Wareham estimated the cost of a 118 kW system at $887,059 before application of state rebates (which could be as much as $254,240 in the first year.) The financial analysis associated with the quote estimated an average energy cost savings of $38,072 annually for thirty years. The payback period would be approximately 16 years. Barrier: There are not 16 years left on the lease.	
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	4	X				Energy Use	Building & Facilities		Energy					NAREL has included in the B&F request for the facility roof to be replaced in FY2010 with a light reflecting roofing membrane. This reflecting roof will reduce the heat load generated by the sun, thus reducing the costs to cool the facility. Barrier: OARM funding.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL/Atlantic Ecology Division - Narragansett, RI	4	X				Energy Use	Building & Facilities		Energy					We have been asked to go from a 2% utility reduction per year to a new standard signed in January of 2007 to a 3% reduction. Also, the Agency is required to install local power generation at 50% of EPA's facilities. Barrier: These mandates require funding, although our budget provides no increase in funding to modify or add infrastructure to meet these goals.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL/Western Ecology Division - Corvallis, OR	4	X				Energy Use	Building & Facilities		Energy	Savings Not Yet Known				New more efficient building and facilities per WED Master Plan. Barrier: B&F funding limitations to ORD.	

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OSWER/Environmental Response Team - Edison, NJ	4	X				Energy Use	Building & Facilities		Energy, & Cost of Utilities					The ERT Laboratory is housed in a dozen 15+ years trailers having a total area of more than 10,000 square feet rather than in a convenient single building. The trailers are not energy efficient or conducive to optimal equipment and instrumentation operation and use for trace level environmental analyses. Due to their age and condition, it is not feasible or economical to upgrade the heating and air conditioning, electrical, fume hood, lighting and electrical systems of the trailers. EPA facilities personnel will not allow the purchase of additional trailers for laboratory use. It has been proposed to relocate REAC office and laboratory functions/activities to currently available space in Building 205 Bay C along with ERT office functions.	No quantification of savings. Barriers to implementation not specified. FURTHER INQUIRY NEEDED.
Region 10 - Manchester, WA	4	X				Energy Use	Building & Facilities		Energy					Many opportunities exist to reduce energy use during renovations. Barrier: There has been a general reluctance by OARM and its architectural and engineering contractor to thoroughly investigate and aggressively pursue these options (e.g., solar power, natural day-lighting techniques to reduce dependency on electric lighting, etc.).	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	4	X				Energy Use	Energy Deregulation		Energy	Up to $100,000 / Year				Identify opportunities through energy deregulation to lower annual energy costs at the facility. Regional Facilities are requesting approval from GSA to seek an annual contract through a deregulated energy provider. Compare various energy providers to obtain least expensive kWh unit cost. Obtain GSA approval to secure one, two, or three year fixed rate contract. Barrier: Having GSA letter of approval (Houston Lab has attempted to use deregulated energy for the past 3-years and GSA has not provided permission).	
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	4	X				Energy Use	Fume Hoods / Ventilation		Energy					NAREL has included in the B&F request for 10 existing Fume Hoods / Ventilation to be replaced with variable volume Fume Hoods / Ventilation in FY2011. The hoods are used in performing radiochemical analyses on environmental samples. Concentrated acids are used in the procedures and while we have minimized the amount of acids used the Fume Hoods / Ventilation deteriorate over time. The variable volume hoods will allow for reduced exhaust of conditioned air when the hoods are not in use reducing energy costs. Barrier: OARM funding.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	4	X				Energy Use	Fume Hoods / Ventilation		Energy		10-20% Reduction			Conversion to Variable Air Volume Fume Hoods / Ventilation in the Marine Toxicology and Chemistry Laboratory, the Microbiological Laboratory and Warehouse, and the Marine Environmental Assessment Laboratory would reduce the energy consumption. Barrier: The cost of replacing conventional hoods is prohibitive at this time.	
Region 6 - Houston, TX	4	X				Energy Use	Fume Hoods / Ventilation		Energy					Conversion of constant air volume laboratory hood exhaust to 2-position laboratory hood exhaust. Installation of controls and 2-position exhaust air valves to reduce conditioned room exhaust and required make up during occupied (4-8 ACH) and non occupied hours (2-6 ACH). ROI 5+ years. Estimated cost $500K+. Barriers: Funding, funding program(s) or incentives. Possible unwillingness to fund energy conserving projects unless the ROI payback period is within 1 or 2 years.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	4	X				Energy Use	Fume Hoods / Ventilation		Energy					Install automatic power shut off of fume hoods on weekends and holidays. Barrier: Due to the current HVAC/Constant volume hood design this would involve extensive modification to the current lab systems.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 9 - Richmond, CA	4	X				Energy Use	Fume Hoods / Ventilation		Energy					The Region 9 Laboratory explored the possibility of ganging the fume hoods in order to install variable air volume fume hoods. The conservative payback was calculated to be approximately 14 years. Barrier: There are not 14 years left on the lease. If the option to renew (for 10 years) were exercised now instead of later, the retrofit could be done, payback achieved and a future cost saving realized for several years.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	4		X			Energy Use	Generators & Heat Exchangers		Energy	Up to $100,000 / Year (payback period 1-2 years)				Installation of Centralized heat and power (CHP) micro turbine single air bearing systems. Installation of 6-8 capstone micro turbine generators with heat exchangers. ROI 5-6 years. Initial investment of $500K+. Barriers: Funding, funding program(s) or incentives. Possible unwillingness to fund energy conserving projects unless the ROI payback period is within 1 or 2 years.	
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	4	X				Energy Use	HVAC System		Energy					NAREL has included in the B&F request for the facility control systems to be replaced in FY2007 with up to date controls that will allow for more efficient control of the facility air handling units. This upgrade to the control systems will provide cost saving by decreasing energy consumption. Barrier: OARM funding.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	4	X				Energy Use	HVAC System		Energy					Reduce office and laboratory temperatures in the winter and raise them in the summer by 2-3 degrees more than currently being employed. Affects worker productivity and comfort.	No quantification of savings. Barriers to implementation not specified. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	4	X				Energy Use	HVAC System		Energy	$1,100 / Year				Installation of a new condenser water pump and new chilled water pump with associated piping modifications. Implementation cost between $7-9K. ROI less than 8 years. Barriers: Funding, funding program(s) or incentives.	
Region 6 - Houston, TX	4	X				Energy Use	HVAC System		Energy		Approx. 106,676 kWh Electricity / Year			Installation of VFD drive for the air handing units and pumps. ROI 5-years. Possible unwillingness to fund energy conserving projects unless the ROI payback period is within 1 or 2 years. Barriers: Funding, funding program(s) or incentives.	
Region 8 - Golden, CO	4	X	X			Energy Use	HVAC System		Energy					Updating the lab's chiller to increase energy efficiency. During the transitional seasons (spring and fall), a number of days are required for the chiller unit to be operated. The chiller has a 270 hp electric motor without option to modulate to slower speeds. It only runs at 64%-100% even during low demand periods. Barrier: The facility is leased and no budget exists for capital expenditures that would facilitate innovative improvements by replacing inefficient, low-bid technology.	Region 8 included in their response a list of nine possible methods for increasing chiller energy efficiency. However, potential efficiency increases were not quantified. Region 8 also provided an 80+ page "Central Plant Study," which further discusses this method. More information is needed on which method/combination of methods would be the preferred approach and what the projected cost savings/efficiency gains would be. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	4	X				Energy Use	Lighting		Energy		<1% Reduction			Installation of hardware and software to achieve various upgrades of the Lighting retrofit. Implementation cost between $4-5K. ROI less than 10 years. Barriers: Funding, funding program(s) or incentives. Possible unwillingness to fund energy conserving projects with longer return on investment.	
Region 6 - Houston, TX	4	X				Energy Use	Lighting		Energy					Motion sensors are being utilized in most office spaces to turn off lighting while they are not occupied. All of the lab areas, bathrooms, and hallways could also be outfitted with motion sensors to turn off lighting in those additional areas when not in use. Barriers: It is not known how much time would be required for payoff, and it may be a concern with lease renewal coming up in a short time.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings					Description	Comments
		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 7 - Kansas City, KS	4	X				Energy Use	Operations & Maintenance		Energy					Increase direct influence on the operation and maintenance of the facility. Meeting targets and goals such as energy and water use reductions can be extremely difficult to achieve if there ineffective means to enforce leasers to meet or exceed operational requirements. Barriers: Limitations in lease agreement.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 9 - Richmond, CA	4	X		X	X	Energy Use	Return to Conventional Energy Sources		Energy	$25,000 / Year				The purchase of 100% green power increased the Region 9 Laboratory's rate for electricity purchase by 17% per year. Going back to conventional energy could save the Agency more than twenty-five thousand dollars per year at the Region 9 Laboratory alone. Barrier: Purchasing green power is "the right thing to do" and an objective in the Agency's EMS.	
Region 4 AND ORD/NERL/ Ecosystems Research Division - Athens, GA	4	X				Energy Use	Space Utilization		Space & Fuel	Option 1 - $297,600 / Year; Option 2 - Not yet determined; Option 3 - Not yet determined				Move Field Equipment Center (FEC) to more convenient EPA owned space/land. The R4 SESD leases 10,200 sq. ft. of warehouse space for storing, cleaning, decontaminating and loading of field equipment and supplies. The FEC i$161,600/yr s located 10 miles from the R4/SESD laboratory and leased for $104,445/ yr. The annual cost of traveling to and from the FEC is estimated at $161,600/yr. Option 1. Convert existing Lifespan Daycare Center to FEC. (Barriers: Cost of retrofitting the building, determining if there is adequate space to house the FEC equipment and operations, assessing the impact of discontinuing the Lifespan Daycare Center operation, and the possible use of the Lifespan Daycare Center for other ORD/ ERD needs.) Option 2. Construct a FEC on EPA property. (Barriers: Cost and feasibility.) Option 3. Construct a FEC on existing SESD leased property. (Barriers: Cost and feasibility.)	

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 4 - Athens, GA	4	X				Energy Use	Steam Generation		Energy	$11,780 / Year (does not include the purchase and installation costs)				Steam Generation. Steam is generated by two 127 HP Kewanee low pressure boilers, which provide steam for the constant temperature regulation of the building. These boilers are operating at approximately 72% fuel to steam efficiency. By replacing these with a more efficient boiler, a savings of 15% could be expected, or an estimated $11,780/ yr. The project cost for boilers and installation is estimated to be $223,000. Barriers: Installation costs of approximately $223,000. The SESD facility is leased, and approval would be required from building owner. A more detailed evaluation will be required before implementing.	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	4	X				Energy Use	Uninterrupted Power Supply (UPS)		Operations & Maintenance	Savings Not Yet Known				The Region 2 Laboratory's current UPS provides coverage to our critical instrumentation for electrical outages lasting between five and ten minutes. The Laboratory reviewed options for a replacement system which included a replacement with a new a battery-based system and an alternative approach using a Microturbine system. The system is estimated to provide a fairly significant savings in electricity usage and overall energy cost to the facility. It is estimated that the building would require six Microturbine units at a cost of 100,000 per unit. Based on the estimated annual electric and energy use reduction, this cost could be recouped in approximately five years of using the new system. Barrier: Total cost of approximately $600,000. Currently, obtaining B&F funds for this project is very unlikely due to other priority projects for the facility as well as the high cost of this project.	
Region 4 - Athens, GA	4		X			Energy Use	Vehicle Fleet		Fuel	Approx. $19,854 / Year				Improve GOV Gas Mileage. An inexpensive (less than $10) part inserted into the vehicle air inlet hose can improve gas mileage by generating a vortex of air, allowing the vehicle engine to operate more efficiently, and thereby improving fuel economy. Barriers: Approval to place these units on GOV's and testing of actual performance achieved.	The estimated savings use the "Whirlwind Vortex Generator" and assume a 3 mpg increase in fuel economy.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	5a		X			Energy Use	Building & Facilities		Energy					In addition to the ESPC, NVFEL replaced all existing T-12 fluorescent lighting with T-8, electronic ballast technology in 1996. We are currently installing some T-5 technology, and have switched to low mercury tubes to eliminate disposal costs of spent tubes. A look at air exchanges rates, room pressurization, and chilled water temperatures would be useful for any facility. It may also be worthwhile to consider the use of an existing transportation natural gas contract to reduce cost, and GSA contracts for electricity.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	5a	X				Energy Use	Building & Facilities		Energy					In 2003 NEIC moved into a newly renovated building. The old building had been expanded piecemeal over 30 years and the final laboratory and office layout was extremely inefficient. The laboratory space was intermingled with office space, such that hazardous chemicals, including gases, standards, solvents and samples, were regularly being transferred through office areas. The temperature controls were so poorly designed and electrical supply so underpowered that highly sensitive instruments were regularly out of order when needed for analysis. The new building is equipped with a Building Automation System (BAS) which controls with great precision the heating, cooling, and air flows using servo-mechanical devices optimized to provide ideal laboratory conditions, office comfort, and energy efficiency. The new building also allows the total separation of the offices and laboratory space, analytical areas grouped by functionality and laid out in a logical sequence, and energy saving set-backs controlled by laboratory lighting and the positioning of hood sashes.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	Building & Facilities		Energy					Center Hill Office Wing Facility Renovations -2000. Three phase project, each with significant energy-conservation aspects: new, energy-efficient HVAC units, thermal insulation, and replacement windows.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other			
ORD/NRMRL/Ground Water & Ecosystems Restoration Division - Ada, OK	5a	X				Energy Use	Building & Facilities		Energy	$270,000 in first year (similar results second year)	40% Reduction in first year (similar results second year)			RSKERC completely renovated its heating, ventilation, and air conditioning (HVAC) system through an Energy Savings Performance Contract (ESPC). The project involved replacement of the facility's existing HVAC equipment with a vertical bore ground source heat pump (GSHP) system that uses both water-to-air and water-to-water heat pumps. The system also includes a chiller to supplement the heat pumps during peak cooling conditions, and an air-to-air heat pipe heat exchanger to pre-cool or pre-heat inlet air using exhaust air. A direct digital control (DDC) building automation system was installed as well to monitor and control the operation of the new equipment. Variable Air Velocity (VAV) controllers were implemented in all existing hoods which previously operated in a constant volume mode. The performance period of the ESPC contract is 24 years. Construction of the project was completed in November 2004, and EPA accepted the equipment in June 2005.	
Region 1 - Chelmsford, MA	5a	X				Energy Use	Building & Facilities		Energy					When opened in 2001, EPA New England's laboratory received a LEED Gold Rating for its green design, in recognition of its energy efficient design, its active and passive solar power, its use of recycled materials in construction, and its environmentally-friendly landscaping. However, the Laboratory has continued to work on improving its energy performance.	No quantification of savings attributed to the construction of this new facility. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	Fume Hoods / Ventilation		Energy					Employ a positive feedback system on the hoods that are open after 7:30pm. By informing the managers that hoods are being left open after hours, we have reduced the average percent of open hoods from 10-20% to 1-2% per night.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	5a	X				Energy Use	HVAC System		Energy					A heat recovery ventilation unit was installed during the 2000 Lab office renovation to reduce the amount of energy needed to condition (heating and cooling) indoor air.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy					AWBERC 800 Ton Chiller Installation-1999. Installed to replace absorption chiller thereby elimination the need to run a boiler in off hours to produce steam for absorption chiller cooling.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy					AWBERC Boilers #1 & #2 Refurbishing- 2003. The refurbishment of the two original AWBERC boilers installed in 1974 was designed to restore safety, reliability and energy efficiency to the equipment.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other			
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy, Water, & Cost of Utilities					AWBERC Cooling Tower Water Treatment-1990/1998. Magnetic treatment of cooling tower water for the rooftop units requires no chemicals and less water.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy					AWBERC HVAC Control System (Metasys) Expansion-2000. Add control of additional equipment to the existing Johnson Metasys system. This will allow for more efficient operation of equipment, and remote monitoring and control of equipment at outlying facilities. (For example, the boiler operator at AWBERC can adjust temperatures, shut down equipment and implement nightly set back of the Air Handler units at outlying facilities via the Metasys system).	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a					Energy Use	HVAC System		Energy					AWBERC HVAC Control System-1995. A Johnson Metasys control system was installed to replace the original (early 1970's) Honeywell system. This system monitors and controls the operation of all mechanical systems in the AWBERC facility. Some of the energy conservation features of this system include the capability to program night set-back of the HVAC system.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy			20% Reduction in fume hood exhaust		AWBERC HVAC Rebalance-1998. The HVAC system at AWBERC was rebalanced, to reduce the fume hood exhaust air volumes back down to 80 fpm full open (a 20% reduction in fume hood exhaust). This project also eliminated the introduction of unconditioned, humid air, and the amount of outside air infiltration, thereby reducing the need to overcool/reheat for dehumidification.	
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy					AWBERC Rooftop Cooling Towers-1998. Two rooftop cooling towers were installed to provide recirculating condensing water for the computer room and environmental chambers, eliminating the need to use once-through city water [Completed 1990]. A third cooling tower, 150 tons, added to serve over 45 packaged AC units, located throughout the facility.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy					AWBERC Summer Boiler-2001. New energy-efficient small capacity packaged boiler for summer steam requirements (autoclaves, domestic hot water).	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy		20% Reduction			AWBERC-Chiller Replacement-1999. The AWBERC Facility has two new centrifugal chillers to replace the original (early '70's) chillers. The original chillers were rated at an efficiency of 0.78 KW/ton, where the new chillers are rated at 0.62 KW/ton (20% more efficient). Additionally, the new chillers are much more efficient at low load.	
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy					Boiler Burners Replacement-2000. AWBERC's original 1974 burners were replaced with more energy efficient, Low NOx burners that are able to fire on dual fuels (natural gas and #2 fuel oil).	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy					Research Containment Facility (RCF) Heat Recovery System-1987. The RCF was designed with a heat recovery loop, recovering heating and cooling energy from the exhaust air stream and transferring it to the supply air stream, saving heating and cooling costs.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy					T&E Facility Air Handling Unit (AHU)-2000. New rooftop AHU serving the office wing is more energy efficient than 1970's model it replaced.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy					T&E Facility Boiler-1999. Replacement of original (late 1970's) boiler (oil fired), with new, more efficient oil/gas boiler.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	HVAC System		Energy					T&E Facility Summer Boiler-1996. A small boiler was installed at the T&E Facility to provide summer steam needs (i.e. reheat), eliminating the need to run the large boiler in the summer.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	HVAC System		Energy					Adjusted the reheat temperature for the room heat exchangers to be scalable and to monitor outside air temperatures to determine the appropriate temperatures. The scale was set from 0°F to 55°F and above for outside temperatures to 180°F to 160°F for the hot water to the reheat coils for the rooms. By scaling according to outside air temp, we reduce the need to needlessly heat space that isn't calling for it.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	HVAC System		Energy					Changed the exit velocity out of the facility main exhaust from 3000 fpm to 1900 fpm during the unoccupied periods. This reduces the fan speed for the exhaust fans. We would like to explore reducing this velocity further and to possibly reduce the number of EFs from 4 to 2 during periods of non-occupancy.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Type	Savings			Reinvestment of Savings	Description	Comments
		F	E	P	A					$	Energy	Other			
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	HVAC System		Energy					Installed a pony boiler (summer boiler) to reduce the demand on the oversized building boilers for summer operation. The project was funded by OARM. The use of the pony boiler reduced our summer natural gas demand and reduced the wear of the larger boilers who could not turn down sufficiently enough to be economically cost effective. The summer boiler operates longer, cycles less but uses less natural gas than the equivalent full sized boiler would operate.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	HVAC System		Energy					Raised temperature on chill water from 45ºF to 48ºF. In conjunction with the reduced fan speed in manual operation, we changed the condenser water to 70ºF from the 74º/80ºF setting for the 2 speed motor. By reducing the condenser water temp we reduced the head pressure on the chiller and thus reduced the amp demand by the chiller. Overall this maximized the efficiency on the chiller and reduced the electrical demand on the facility during normally high electrical demand periods.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	HVAC System		Energy					Raised the temperature at which point the chillers come on. The design called for the chillers to come on at 55oF. That temperature was raised to 62oF and was coupled with outside enthalpy (humidity monitoring) to use outside free cooling as much as possible during the shoulder seasons. The original design had one cooling tower (and it fan) associated with one chiller for operation. Thus when the facility required more cooling, the first option would be to turn on another chiller (high electrical demand) rather than increasing the number of fans (modest electrical demand).	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	HVAC System		Energy					Reduced static air pressure settings for the AHU units for unoccupied periods. Office and utility space static pressure was changed from 1.5" to 0.5", while laboratory space was changed from 2.0" to 1.5". We plan to look at the exhaust fan static pressure as well. However, this pressure change for unoccupied periods would have to be in concert with exit velocity settings.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other			
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	HVAC System		Energy					Reprogrammed the AHUs from operating under full operating conditions 24/7 to be adjusted based on occupancy. Reduced overall air changes for the facility with significant cost savings on the order of hundreds of thousands of dollars per year. This effort was the major recommissioning effort ESC undertook within 2 years of occupancy. The recommissioning was paid for by OARM.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	HVAC System		Energy					Reprogrammed the air handling units (AHU) to reduce air flows (sequence of operation) and to maximize one unit prior to bringing another full AHU on line. Raised the AHU discharge temperature from 55°F to 60°F. The original system was designed to make the air much colder to wring out moisture from the air and then reheat it back up in the space. This required more heat load from the boilers. The air temperature adjustment in the summer reduced the demand on the chiller and the boiler while not adversely affecting the humidity control for most of the building.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	HVAC System		Energy					Shut unneeded exhaust fans off when not required during unoccupied periods. Plan to add bathroom exhaust fans to scheduler that will allow for turning off those fans during unoccupied periods.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	5a	X				Energy Use	HVAC System		Energy & Water					Water is collected for cooling towers at R6 lab to reduce overall water usage. This concept could be expanded to include irrigation needs if payback was short enough for lease consideration. Houston has a very high annual rainfall rate.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a		X			Energy Use	Lab Equipment		Energy					The Microbiology Laboratory recently determined that the internal mechanism for operating the Biological Safety cabinets could be shut down when not in use without compromising employee safety in the laboratory. This action results in lower energy usage for this equipment.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a		X			Energy Use	Lab Equipment		Energy					The Microbiology Laboratory recently purchased and installed smaller, more energy efficient incubators. These incubators replace large, less efficient older units.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	5a	X				Energy Use	Lighting		Energy					Green Lighting systems were specified and installed in the Laboratory Office renovation completed in 2000.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

Laboratory	Category	Part(s) of Infrastructure Affected: F	E	P	A	Section	Focus of Project	Partner(s)	Savings: Type	$	Energy	Other	Reinvestment of Savings	Description	Comments
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	Lighting		Energy			2,690,892 Lbs Air Pollution / Year		AWBERC Green Lights-1996. Entire AWBERC facility (interior and exterior) retrofit with energy efficient lighting. Occupancy sensors added to many single offices. Timers installed on corridor lights.	
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	Lighting		Energy					AWBERC Parking Lot Lighting-2003. New more energy efficient exterior lighting installed in the parking lot and plazas.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	Lighting		Energy					Green Lights-2002. Center Hill Facility retrofitted with energy efficient lighting. Occupancy sensors added to single offices. Timers installed on corridor lights.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	5a	X				Energy Use	Lighting		Energy	$25,500 / Year	1,020 Million BTUs / Year			All lighting in all buildings was replaced with Green Lighting prior to 2003. This work was carried out over several years under several contracts. Estimated savings from this program are 1020 MBTU per year and $25,500.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	Lighting		Energy					Installed manual light switches for hallway lights. Previously, all hall lights were on all the time.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	Lighting		Energy					Installed Photocells for parking lot lights. Previously, time clocks were employed and the lights were never on when they were needed.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	5a	X				Energy Use	Lighting		Energy	Unknown				All offices in the R6 Laboratory have motion sensors that shut off lights when unoccupied. Unknown exact cost savings. These sensors are currently not available in laboratory, bathrooms, or hallway areas.	
Region 6 - Houston, TX	5a	X				Energy Use	Lighting		Energy					Low energy fluorescent light bulbs and ballasts were installed in the R6 lab in order to reduce energy consumption. It is unknown how much in energy cost savings have been realized from this project.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	Power Factor Correction		Energy					AWBERC Power Factor Correction-1997. Capacitor banks were installed at AWBERC to raise the power factor above 90% and to avoid a penalty on the electric bill (thus saving dollars, rather than actual electricity). Low power factor is caused by inductive motors, which require electricity to induce a magnetic current.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	5a	X				Energy Use	Space Utilization		Energy	$40,000 / Year				The OSWER ERT contractor eliminated five trailers in 1999 in order to provide a fire break between two sides of their tra ler complex and to reduce energy consumption. These trailers were approximately 20 years old and consumed more a significant share of energy and maintenance expenses. The trailers were not replaced, and the functions housed in these trailers were accommodated in other trailers through more efficient space utilization. The estimated savings from this program is $40,000 per year in energy costs.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Energy Use	Uninterrupted Power Supply (UPS)		Operations & Maintenance					The ACB recently connected its Mass Spectrometric instrumentation to the ESC facility uninterrupted power supply (UPS) and back-up generator. The laboratory currently has seven mass spectrometers worth over $2 million, and had suffered main electrical board damages and instrument failures due to power outages, resulting in major repair costs of several thousands of dollars. The laboratory is now able to produce more reliable and accurate data, since the power supply is steady and un-interrupted, as any power fluctuations would have caused differences in signal background and sensitivity. This also reduces the need for chemists to travel to laboratory on nights and week ends to check on the instrumentation running overnight samples. In addition to increasing the efficiency of the laboratory operation, this reduces travel, gasoline use and emissions.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a		X			Energy Use	Vehicle Fleet		Fuel					GSA vehicles: As the vehicles in our fleet are returned to GSA, we are securing either hybrid vehicles or E-85 vehicles to save money on gasoline.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Energy Use	Water System		Water			20% Reduction in water usage		Char-Pure (Chardon Chemical) Unit-2003. Installed to treat main cooling tower, eliminated the use of chemical treatment and projected to save 20% in water usage	
ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	5b	X				Energy Use	Building & Facilities		Energy					Use of insulating paints on flat roofs and large metal doors significantly reduces the transmission of solar heat into the building. The same is probably true for sides of buildings. RECOMMENDED	
ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	5b	X		X		Energy Use	HVAC System		Cost of Operation					Use of polarized lubricants in HVAC compressors significantly reduces friction and reduces the energy to operate this equipment. RECOMMENDED	

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		F	E	P	A				Type	$	Energy	Other			
ORD/NERL/Environmental Sciences Division - Las Vegas, NV	5b	X				Energy Use	Space Utilization		Space & Labor	$82,380 / Year (current lease value); $50,000 / Year (cost of 1 contractor)				ESD is presently working to optimize space efficiency and is considering an option that could include closing our leased warehouse. Presently, OAR occupies 13,551 sq. ft. of space including 4,900 sq. ft. of laboratory space within ORD leased facilities. OAR is leasing another unoccupied building awaiting conversion to laboratory space by OARM. When the conversion is complete, OAR intends to vacate the facilities leased by ORD. The Agency will continue to lease the space previously inhabited by OAR with a current value of $383,000 annually. It seems that considerable cost savings could be realized through a thorough analysis of space efficiency in Las Vegas for ORD as well as the other colocated AA-ships.	
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	5b	X				Energy Use	Space Utilization		Space					In an effort to maximize the use of laboratories, NERL/HEASD branch chiefs are analyzing laboratory use and re-assigning spaces by needs and projects instead just branches. The focus is the research areas. This represents effective use of space by the division.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/Environmental Sciences Division - Las Vegas, NV	5b	X				Energy Use	Space Utilization		Space	$173,246 / Year (current lease value); $692,983 Projected total cost savings from present to 2011				ORD currently holds a lease for an aerial photographic archive in the La Plaza Center. Should OAR vacate ORD space as planned, ORD is considering terminating the La Plaza Center lease and moving the archive to the space vacated by OAR. It seems that considerable cost savings could be realized through a thorough analysis of space efficiency in Las Vegas for ORD as well as the other colocated AA-ships.	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	5c	X				Energy Use	HVAC System		NE	NE	NE	NE		A heat recovery desiccant cooling system was installed in the Region 2 Gas Chromatography Laboratory in 1998. This use of this system purported energy savings of approximately 50% when compared to a conventional humidity controlled air conditioning system. Unfortunately, the system proved to be unreliable due to the delamination of the desiccant wheel and the tendency of the desiccant to concentrate hazardous constituents of the fume hood exhaust over time (which would be suddenly released back into the laboratory when the system failed). After approximately two years of troubleshooting and redesigns, the system was replaced with a conventional gas-fired/DX package unit.	

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ORD/NHEERL/Atlantic Ecology Division - Narragansett, RI	5c	X	X			Energy Use	Return to Conventional Energy Sources		Energy	NE	NE	NE		We burned B-20 bio-diesel in our boilers (300,000 gallons) over a three year period. The cost of the blended fuel was on average 50% more expensive than standard home heating oil. On a local cost it was prohibitive, and on an energy calculation you had to add in the transportation/shipment of the bio-diesel product from New Haven, Connecticut vs. purchasing local home heating oil from Providence RI. We have since returned to burning natural gas as our primary heating fuel.	
Region 6 - Houston, TX	5d	X				Energy Use	Alternative Energy Sources		Energy					Add natural daylight offset to artificial lighting with solar fiber optic light tubes. Solar, wind geothermal, and/or natural gas energy power generation. New technologies in geothermal (in the Southeastern Texas Area) and solar energy should be explored, especially as emerging technologies become more established and benchmarking versus current energy providers is possible.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	5d	X				Energy Use	Alternative Energy Sources		Energy	Savings Not Yet Known				Install solar panels on roof or investigate geothermal energy sources to tap alternate energy resource. Equipment is identified, and cost reduction estimate will be completed.	
Region 6 - Houston, TX	5d			X		Energy Use	Employee Behavior		Energy					Monitor whether computers and instruments are being shut down when not in use (evenings and weekends). Currently offices and laboratories are periodically checked to ensure that occupants are properly powering off equipment in accordance with EMS energy conservation guidelines. Suggest implementation of more vigorous approach/enforcement (e.g., using cleaning crews to power off select (non lab) equipment nightly.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	5d	X				Energy Use	HVAC System		Energy					6EN energy study using camera, as part of ongoing energy study request use of 6EN - FLIR camera to identify heat/cold loss.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	5d	X				Energy Use	HVAC System		Energy					Shut down HVAC on weekends and holidays. This would be a very inexpensive implementation only requiring approximately 30 minutes per shutdown/start up cycle with significant cost savings to the R6 lab. Would require cooperation from Lessor.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	5d	X				Energy Use	Lighting		Energy					Sensors installed to turn room lights on and off have been installed throughout the NAREL facility. The sensors turn the lights off in an unoccupied space reducing energy costs to light the facility.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	5d		X	X		Energy Use	Vehicle Fleet		Fuel					ALL EPA personnel are requested to use the least expensive and most energy efficient means possible when traveling. Employees traveling to the same location should ride in one vehicle so that costs can be reduced and energy be saved.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1				X	Other Significant Initiatives	Consolidation	Unnamed Agency	Contracts Management	$80,000 saved per $1,000,000 spent for next 5 years (management costs reduced from 10% to 2%)				Utilization of an IT contract from a partner agency.	
OARM - RTP, NC	1			X	X	Other Significant Initiatives	Consolidation		Contracts Management	$7,053.35 / Month (19.5% reduction); Potential annual savings of $84,640.20.				Triage of all service calls before submittal to the contractor for action (starting June 2006). An EPA employee may contact the Contractor for minor repairs requiring 24 hours of time or less in labor and/ or $1,000.00 or less in materials. Unless it is an emergency (anything related to safety and security), the service call work request is submitted to the Project Officer for approval before the work is initiated. Where as in the past all routine service calls were stamped approved and sent downstairs, now a Service Call Manager will investigate whether current ongoing maintenance work would resolve the issue; whether the service call had already been submitted; if the service call should be deemed urgent and immediately sent downstairs or held pending fund consideration. The triage of service calls eliminated a substantial number of redundant calls, as well as, improved scheduling by eliminating dispatching two people to fix the same problem.	
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1				X	Other Significant Initiatives	Consolidation		Contracts Management	Approx. $250,000 (3 FTEs) in 2007				NRMRL devoted over 6 FTEs to manager the Lab's HR responsibilities prior to 2006. A human resource representative was located in each division. When 2 HR representatives retired, NRMRL consolidated the HR support function to four FTEs on a central staff. An additional retirement in February of 2006 reduced the support staff to 3 FTEs. The majority of the managers being served indicate the consolidated services are as good or better.	

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ORD/NERL/Ecosystems Research Division - Athens, GA	1				X	Other Significant Initiatives	Consolidation		Contracts Management	$100,000 / Year				Consolidation of Facility Support Contracts. In FY06, ERD consolidated four facility support functions (Operation and Maintenance, Janitorial Services, Security, and Grounds Maintenance) into one 8a five-year contract. This action eliminated the need for about a dozen smaller facility support related contracts, minimizing time spent issuing contracts. ERD estimates a real cost savings of approximately 10% per year ($100,000) based on efficiencies of operation (lower overhead costs, for example).	
ORD/NERL/Ecosystems Research Division - Athens, GA	1				X	Other Significant Initiatives	Consolidation		Contracts Management	$4,000 / Year				In 2006, ERD consolidated trash removal and recycling with a new vendor, resulting in an annual savings of $4k, while at the same time resulting in more services.	
ORD/NHEERL - RTP, NC	1				X	Other Significant Initiatives	Consolidation		Contracts Management					Consolidation of three contracts for Epidemiology studies being conducted by our Human Studies Division located in Chapel Hill, NC into one contract with one statement of work.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL - RTP, NC	1				X	Other Significant Initiatives	Consolidation		Contracts Management					NHEERL-ORD has consolidated the Histopathology contract which provides histopathology services to our Environmental Carcinogenesis Division located in RTP, NC and our Mid-continent Ecology Division located in Duluth, MN. Consolidation of these contracts has reduced overall costs since the contract is awarded to one contractor using one statement of work, reduces the number of work assignments, reduced the number of COR's from four to two and reduced the number of CS's (contract specialist) from 2 to 1 which results in cost savings in hours.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1				X	Other Significant Initiatives	Consolidation	OSWER/ERT & ORD/NRMRL	Contracts Management					The Region 2 Edison, New Jersey Facility has one facility contractor to manage the security, mail delivery and janitorial services. In addition to Region 2, the facility houses ERT and ORD and their contractors. The use of one group for security, mail, and janitorial services is the most efficient means of providing and overseeing these services.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 4 AND ORD/NERL/ Ecosystems Research Division - Athens, GA	1				X	Other Significant Initiatives	Consolidation		Contracts Management					ORD/ERD and R4/SESD currently share one full time position for telecommunications contract support. ORD/ERD is paying $60,000 and R4/SESD is paying $40,000. By using one contract savings are realized in overhead.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 4 AND ORD/NERL/ Ecosystems Research Division - Athens, GA	1				X	Other Significant Initiatives	Consolidation		Contracts Management	$289,800 +				ORD/ERD and R4/SESD share PBX and Voice mail, WAN lines and routers. This is a cost savings, since it does not require the purchase of two systems, cost of duplicate T1 lines and doesn't require personnel to operate two systems. If R4/SESD were required to purchase their own hardware for telecommunications: PBX and Voice Mail system replacement cost today would be approximately $250,000. The cost for R4/SESD to purchase routers would be approximately $35,000. Other costs: T1 line paid by R4/SESD would be approximately $4800/ annually.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1				X	Other Significant Initiatives	Improvements in Efficiency / Upgrades		Contracts Management	Approx. $25,000 / Year				The NVFEL has traditionally maintained a toxic gas detection system that mitigated the risk associated with the measurement of carbon monoxide and nitrogen oxides required for evaluation of vehicle and engine compliance or regulatory development programs. The overall system currently employs nearly 230 sensors for CO, NOx, Oxygen concentration, Freon, Ammonia, and Flammability. In 2006, an IDIQ for the management of this system was implemented. This was the first openly competed IDIQ at the NVFEL, and is expected to improve the operation of the system while saving costs when compared to the cost of individually contracted system expansions and scheduled sensor replacements.	

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OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	1			X		Other Significant Initiatives	Improvements in Efficiency / Upgrades		Purchase	$15,000				NEIC has purchased licenses of Adobe Acrobat for the majority of the field staff to enable efficient conversion of standard Word files to PDF for easy electronic distribution. This has greatly facilitated distribution of files and reports associated with all aspects of branch administrative, management and project work. Additionally, a pilot report project has been completed in which a proposed template for electronic reports and attachments has been approved as a basis for further training. Several of the FY 2007 civil and criminal reports have been prepared in a linked electronic format and supplied to clients on disk. This has greatly decreased time and resource expenditure (i.e. paper and staff time) in preparing, copying, and distributing reports which commonly contain hundreds of pages per single copy. Additionally, investigative photos are now largely stored and distributed electronically, greatly decreasing the traditional cost of photo development for multiple copies of each report. This has results in a large saving of time for high level staff.	
ORD/NHEERL/Gulf Ecology Division - Gulf Breeze, FL	1			X	X	Other Significant Initiatives	Improvements in Efficiency / Upgrades		Labor	$160 / Year		Approx. 2.5 MY / Year staff time		Functions automated using Lotus Notes, including: i) reservations (such as conference rooms, boats, vehicles, portable computers, cameras, conference equipment), ii) visitor requests/approval, iii) procurement requests/approval, iv) travel request/approval, v) facilities work requests, vi) leave request/ approval, vii) award nominations, and viii) security requests.	
OSWER/Environmental Response Team - Edison, NJ	1			X		Other Significant Initiatives	Improvements in Efficiency / Upgrades		Labor	>$300,000 / Year				Major emphasis has been placed upon cross training so that laboratory chemists can maintain, operate, troubleshoot and perform minor repair for multiple analytical instruments and perform multiple sample analyses. The primary pesticide/PCB analyst also performs SVOC analyses for soil/sediment, water and tissue samples and VOC and PAH analyses of air samples collected using sorbent media. Effective cross training has minimized the need to replace analytical chemists who voluntarily terminate ERT/REAC Laboratory employment.	The benefits of cross training were illustrated by the Hurricane Katrina Response during which approximately 4,000 fast turnaround sample analyses were efficiently performed for ambient air samples with minimal negative impact upon other laboratory operations.

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Region 4 - Athens, GA	1			X		Other Significant Initiatives	Improvements in Efficiency / Upgrades		Analysis	Savings Not Yet Known				Explore wiser use of lab resources. Many people that request analytical services are not aware that if they specify exact needs, it saves time and money. If we could ensure that all analyses that are requested are actually needed, a savings in reagents and time could be realized.	
Region 7 - Kansas City, KS	1			X		Other Significant Initiatives	Improvements in Efficiency / Upgrades		Purchase					The Regional Laboratory has implemented the electronic transmittal of analytical results to project managers as a matter of routine. This process allows the project managers to receive the results more promptly than when the results were transmitted only in hard copy. Additionally, the electronic format allows the project managers to be able to input the data into other databases as needed.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	1		X			Other Significant Initiatives	Reduction		Purchase					In support of emergency response requirements, we were able to reduce iridium phone annual card charges. We provided staff the capability for not just phone calls but internet access at less cost than the annual renewal of the minutes required for the iridium SIM cards. We were able to negotiate a rate that enables us to surge should a need arise that was less than purchasing additional minutes for the iridium phones.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1		X		X	Other Significant Initiatives	Reduction		Maintenance	$200,000 / Year				Disconnection of the laboratory instrumentation data system from the Internet reduced the required maintenance of the system dramatically, since the security patches and network traffic associated with Internet connection were no longer required.	
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1		X		X	Other Significant Initiatives	Reduction		Maintenance	$16,600 FY04; $7,300 FY05; $44,000 FY06				A cost-savings strategic plan was implemented during FY 2004. The product resulted in a critical process that enabled MCEARD to reduce the number of existing equipment maintenance agreements. Prior to purchase of a maintenance agreement, a thorough analysis determined whether adding another agreement was practical. Comprehensive information used as a guideline for existing equipment is as follows: age and life expectancy; beneficial rationale for continuation with annual cost of the maintenance agreement; vendor parts availability; and a cost comparison to replace and/or repair the equipment if a maintenance agreement was not established.	

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ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1				X	Other Significant Initiatives	Reduction		Labor	Reduction of costs by $100,000 / FY		0.7 FTEs		NRMRL has employed a strategy to reduce the need for multiple Project Officers for similar agreements by employing a functional acquisition strategy. NRMRL manages the Senior Environmental Employment Agreement for Cincinnati (ORD, OARM and OW), and the NRC post doc agreement for all of ORD. The NRMRL field support contract (STREAMS) and the Technology Transfer contract support multiple EPA program offices in addition to ORD. We estimate the collective savings for the SEE and NRC agreement to be approximately .25 FTEs, the estimated savings for the two contracts is approximately .7 FTE. The majority of the savings are evident in the consolidation of the pre-award effort. Accordingly, for each fiscal year, we have reduced Project Officer management PC&B costs by approximately $100,000. We are working with the other Laboratories, Centers and Offices in ORD to prepare a consolidated functional contract strategy which could identify significant Project Officer management reductions in the future.	
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	1				X	Other Significant Initiatives	Reduction		Labor	$300,000 / Year (since 2004) due to plan; $220,000 / Year due to hiring receptor modeler; $170,000 / Year (since FY07) due to hiring organics lab tech.				An analysis comparing in-house workforce cost versus contracting support resulted in a workforce hiring plan that reduces the Division's overall extramural expenses. Through this workforce plan, the division hired an SEM/XRF operator. The instrument was previously run by contractors. The estimated cost savings on extramural dollars equals $300K per year (since 2004). Following the plan, a receptor modeler/mathematician was hired in FY07 and the contract for that service canceled. The estimated savings are $220K per year. Following the plan, an organics laboratory technician was also hired saving $ 170K per year (since FY07). For each hiring decision, an analysis on how cost effective hiring would be versus contracting the function is done. The analysis includes the grade level considerations and overheads.	

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ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	1		X		X	Other Significant Initiatives	Reduction		Maintenance	$12,000 / Year			Savings re-invested in the labs to offset the impact of a declining budget.	NERL/HEASD has reduced its instrument maintenance costs by assessing which contracts were cost effective. In 2004 an analysis was done comparing prices for service maintenance contracts and the actual costs of instrument repairs. It was determined that some service contracts were not cost effective so they were dropped.	Reinvestment of savings not specific. FURTHER INQUIRY NEEDED.
OSWER/Environmental Response Team - Edison, NJ	1				X	Other Significant Initiatives	Reduction		Contracts Management	$65,000-$95,000 / Year				The combination of experienced, skilled analysts and an effective established preventive maintenance program have eliminated the need for service agreements for three GC systems and eight GC/MS systems used for organic compound analyses. Significant cost savings have been realized by placing a limited number of service calls at an annual cost less than $15,000 as compared to an estimated annual total cost of $80,000 to $110,000 for service agreements for these systems.	
Region 4 - Athens, GA	1				X	Other Significant Initiatives	Reduction		Contracts Management	$30,607 / Year				The room containing SESD records is operated by a contractor under the national ASRC contract. The contractor hours were reduced from 40 to 32 hours per week, with a reduction of the skill level. This reduced the annual costs from $68,519 to $37,912/yr, realizing a savings of $30,607/yr.	
Region 5 - Chicago, IL	1		X		X	Other Significant Initiatives	Reduction		Maintenance	Approx. several $1,000's / Year				Maintenance service agreements costs for analytical instruments were reduced by removing instruments that were several years old and replacing them with more capable state-of-the-art instruments that were within warrantee. An example is the replacement of Agilent 5890 GC's with 6890 models. Also, analytical instrument computers were removed from the agreements which lower the cost for each instrument.	
Region 9 - Richmond, CA	1				X	Other Significant Initiatives	Reduction		Contracts Management	$140,000 from 2003-2007				Funding to Environmental Services Assistance Team (ESAT) was reduced from 1.4 million in 2003 to 1.26 million in 2007. Reduction of funding resulted in staff reduction, decrease in analytical support via the mobile lab on Superfund sites which also resulted in travel dollar savings, vehicle maintenance and equipment maintenance cost reductions.	

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OAR/OTAQ/National Vehicle & Fuel Emissions Lab - Ann Arbor, MI	1				X	Other Significant Initiatives	Restructuring		Contracts Management	$60,000 / Year				New performance-based operations and maintenance contract awarded with broader scope and reduced costs.	
ORD/NHEERL/Western Ecology Division - Corvallis, OR	1				X	Other Significant Initiatives	Restructuring		Labor	$700,000 in Category C allocation (when FY07 compared to FY04); $100,000 in PC&B expenses (when FY06 compared to FY04)*				In 2004 the division undertook a business plan approach to restructure the workforce, increasing the ratio of federal technical support to PI's towards an ultimate goal of 1:1. This plan will be implemented over time, through attrition, and will not only lower overall PC&B costs, but will also reduce the division's reliance upon Category C-1.1 Technical Support of extramural allocations. In order to jump start the program, the division received permission to "float" 6 FTE's over ceiling in 2005.	*The savings in PC&B expenses is due to attrition of higher grade level PI's retiring and being replaced with lower grade level federal technical support, and at the same time, adding 6 federal technical support positions with the authorized "float."
OSWER/Environmental Response Team - Edison, NJ	1			X	X	Other Significant Initiatives	Restructuring	Region 2		$50,000 / Year				A single person provides glassware-washing support for both ERT and Region II laboratory activities.	
Region 10 - Manchester, WA	1				X	Other Significant Initiatives	Restructuring		Labor					The Region 10 Laboratory has pursued a variety of low cost options to assist with analytical chemistry, microbiology, and facility support functions. These include utilizing three trainees under the Department of Veterans Affairs Non-Paid Work Experience Program, taking advantage of the EPA Greater Research Opportunities Summer Intern Program, taking advantage of the University of Washington's Capstone Student Program, and bringing in student volunteers interested in gaining experience in environmental sample analyses.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 10 - Manchester, WA	1				X	Other Significant Initiatives	Restructuring		Contracts Management					The Regional Laboratory is also utilizing its own resources rather than automatically issuing a contract modification for minor (i.e., < $85,000) work that comes up in the course of renovations. For example, the Laboratory took its own paint samples for lead analyses from the area to be renovated, saving EPA money.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1		X		X	Other Significant Initiatives	Restructuring		Maintenance	$40,000 in 2004 compared to 2005				The Region 2 Laboratory has a policy to provide service agreements on all mission critical instrumentation and equipment. Due to the general increase in coverage due to inflation each year and reduced annual budgets, the Laboratory focused its effort on reducing the cost of providing maintenance agreements for its critical instruments and equipment. Through alternative approaches for coverage such as the use of 1) third party vendors, 2) one service vendor for multiple instrument/equipment manufacturers, 3) reduced plans for coverage, and 4) multi-year agreements, the Laboratory was able to reduce the cost by $40,000 in the 2005 maintenance year (compared to the 2004 maintenance year) without sacrificing basic coverage for all critical instrumentation and equipment.	
Region 4 - Athens, GA	1				X	Other Significant Initiatives	Restructuring		Labor	$33,037 / Year				Administrative SEE Position (Receptionist) discontinued.	
Region 5 - Chicago, IL	1			X		Other Significant Initiatives	Restructuring		Contracts Management	$500,000 over 2.5 Years			Put savings towards additional site investigations and reviews each year.	Reduced RCRA program costs by having analyses performed in-house rather than by field contractor.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	2				X	Other Significant Initiatives	Consolidation		Contracts Management					The lab is consolidating agreements with providers of phone, satellite, and related communications service providers to simplify management and oversight.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	2			X	X	Other Significant Initiatives	Improvements in Efficiency / Upgrades		Fuel & Travel					NAREL utilized web-based technologies to participate in the ORIA Leadership Series and ITRC seminars. In addition, staff participated in discipline specific (IT, QA) training and/or discussions through the web-based training.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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OSWER/Environmental Response Team - Edison, NJ	2		X			Other Significant Initiatives	Improvements in Efficiency / Upgrades			Labor				In 2007, hardware/software upgrades will be purchased and implemented for the ERT Laboratory to upgrade existing GC, GC/MS and ICP instrumentation to ensure compatibility with the LIMS. All instrumentation being interfaced to the new LIMS will have Windows XP Professional-based OS so users will experience less functionality as with older operating systems. Software/hardware upgrades will allow for efficient, effective and responsive analysis, processing and storage of air, soil/sediment, sludge, water and tissue samples for VOCs, SVOCs, PAHs, petroleum hydrocarbons (oil fingerprinting) and other organic hazardous materials such as nerve agents (chemical warfare agents) for routine projects and/or during time critical emergency response situations or actions. Since connecting the LIMS with other computer systems can be difficult with proprietary systems, all appropriate hardware will be acquired from the instrument manufacturer.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OSWER/Environmental Response Team - Edison, NJ	2		X			Other Significant Initiatives	Improvements in Efficiency / Upgrades							In 2007, the ERT Laboratory will purchase and implement a Laboratory Information Management System (LIMS) to improve user productivity and increase Information Technology (IT) productivity. Tangible improvements include simplification and automation for reporting, barcoding for sample tracking, automating calculations and data checking, search queries, elimination of transcription errors and better project/sample planning/scheduling. Implementing the LIMS will improve the quality and security of data, help maintain compliance with laboratory accreditation programs, enhance operating efficiency using instrument interfaces to capture data, increase sample throughput with the same staffing level and reduce client risk. Processes such as sample login, sample extraction/digestion, standard preparation, sample batching, reporting, control charting and data export facilitate better analytical data necessary to make decisions that may affect the health and welfare of communities and improves overall laboratory information process quality.	Type of savings not specified and no quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other			
Region 7 - Kansas City, KS	2			X		Other Significant Initiatives	improvements in Efficiency / Upgrades		Purchase, Analysis, & Disposal			Potential tenfold reduction in solvent usage		Analysts will continue to explore alternatives to traditional analytical methods and procedures. One example is the reported possibility of an upcoming study at the ORD laboratory in Ada, OK, which will evaluate the solvent usage of Method 8270. They are apparently going to evaluate the use of solid phase extraction for water analyses. The current extraction procedure for this method uses 360 mL of solvent, whereas, the solid phase extraction process could result in the reduction in the amount of solvent used tenfold. If this study proves that this would be a feasible alternative, the Analytical Section would plan to implement the change here in this laboratory.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	2			X	X	Other Significant Initiatives	Reduction		Labor	$10,000 Every Four Years				NEIC has been working with our accrediting agency to move to a four year external audit cycle from the current two year cycle. This would greatly reduce the time and effort required to prepare for the audits, thereby increasing efficiency and generating savings in direct costs.	
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	2			X	X	Other Significant Initiatives	Restructuring		Energy, Cost of Travel					Depending on the cost difference, NAREL staff may utilize the Birmingham, AL or the Atlanta, GA airports (approximately 2 hours away) for travel rather than the Montgomery, AL airport. The cost of GOV and time in route is considered in making this decision.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL/Western Ecology Division - Corvallis, OR	2				X	Other Significant Initiatives	Restructuring		Labor & Contracts Management	Up to $10,000,000				The division will continue to implement the business plan of restructuring the workforce. Potential savings over the course of the plan could reach a cumulative savings of $10M, including reductions to PC&B, and Extramural Category C1.1.	
ORD/NERL/Environmental Sciences Division - Las Vegas, NV	3	X	X			Other Significant Initiatives	Consolidation		Contracts Management			$1,000 / Month minimum; $36,000 Projected minimum total cost savings from 2008-2011*		ORD has efforts underway to replace the Private Branch Exchange (PBX) with Voice over IP (VoIP). A potential cost saving project for the future would be the replacement of both PBX units and all phones in all colocated EPA organizations in Las Vegas with a single EPA Las Vegas VoIP solution. The cost estimate for the ORD/NERL Las Vegas upgrade is about $300K. The cost savings with one VoIP solution supporting all EPA-LV staff would be dependant on the monthly local carrier cost. Until four years ago, there was a single PBX supporting all colocated entities at EPA-Las Vegas.	*Assuming VoIP installation completed within FY07.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings					Description	Comments
		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
ORD/NERL/HEASD & OAR/OAQPS - RTP, NC	3	X	X			Other Significant Initiatives	Consolidation							NERL/HEASD is consolidating its inorganic laboratory capabilities by collocating equipment when possible and planning hires that would support the work to be performed and not a specific branch.	Type of savings not specified and no quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL - RTP, NC	3				X	Other Significant Initiatives	Consolidation		Contracts Management					Looking to the future, NHEERL plans to consolidate Custodial and Guard Services which are currently awarded under separate contracts into the Division's O & M contract, if possible, when the current contract expires. NHEERL anticipates the first consolidation of such at the Atlantic Ecology Division in Narragansett, RI. The benefits derived from consolidation will be reduced contract costs; reduction in the number of CORs and Contract Specialists (CS); reduction will allow CORs who are scientists to devote more time to research and science; possibly gain 1/2 FTE based on COR working 25% of their time on COR responsibilities; reduction in the number of work assignments; reduction in the number of CSs.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 4 AND ORD/NERL/Ecosystems Research Division - Athens, GA	3				X	Other Significant Initiatives	Consolidation		Contracts Management	Savings Not Yet Known				Presently IT Help Desk support is provided by contractors at the ORD/ERD facility and by FTE at the R4/SESD facility. R4/SESD and ORD/ERD already share the use of the ITS-ACT contract for telecommunications. R4/SESD could possibly expand the ITS-ACT contract for IT services after verifying that the ITS-ACT scope of work has the range of services needed. This proposal will require additional evaluation.	
Region 4 AND ORD/NERL/Ecosystems Research Division - Athens, GA	3				X	Other Significant Initiatives	Consolidation		Contracts Management	$50,000 / Year				Presently R4/SESD is paying $58,000 and ORD/ERD is paying $58,000 a year (total $116,000) for records contractor support (each 32 hrs/week), both utilizing the national ASRC contract. A full-time position shared between ORD/ERD and R4/SESD would cost $66,000 ($33,000 each). The total annual shared savings to the Agency would be $50,000. The proposal would be for the records contractor to work four hours a day at each facility.	
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	3			X	X	Other Significant Initiatives	Improvements in Efficiency / Upgrades		Fuel & Travel					Need to continue to utilize web-based seminars for training and as appropriate working meetings.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings					Description	Comments
		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	3	X	X			Other Significant Initiatives	Improvements in Efficiency / Upgrades		Purchase					Replace existing copper lines with a high speed, secure wireless infrastructure. Replacing this copper infrastructure is expected to cost $200k-$500k. Half of this cost can be saved with a migration to a wireless infrastructure. Initial investment is $175k.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	3			X	X	Other Significant Initiatives	Improvements in Efficiency / Upgrades		Labor	$90,000 (one FTE)				Through the use of enterprise desktop software tools and policies, manage all desktops remotely from a central location with little to no call-to-repair. The majority of all current call-to-repair work can be replaced with a tool that allows desktop diagnosis, software repairs, and updates from a centralized location. Initial Investment = $25K.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	3		X	X		Other Significant Initiatives	Improvements in Efficiency / Upgrades		Software Licenses					Use software management tools to measure, track, and manage the lease of software licenses to staff. Today, licenses cannot be dynamically assigned to staff (they are committed to the desktop) so any new need requires the purchase of an additional license. With a management tool that allows software licenses to be dynamically assigned, thousands of dollars will be saved on software licenses. Initial investment is $30k.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	3			X	X	Other Significant Initiatives	Improvements in Efficiency / Upgrades		Labor	$60,000 / Year when fully implemented in 2008				Utilizing next-generation storage solutions (high-speed disk storage) centralize the backup of all Servers and desktop folders. Utilizing a next-generation high-speed centralized backup system will reduce the need for contractor staff and reverse the proliferation of ad hoc individual backup solutions. Other benefits include reduction in security and virus response activities and improved protection of EPA data. Initial Investment = $125K.	
Region 4 - Athens, GA	3		X			Other Significant Initiatives	Reduction		Purchase	Savings Not Yet Known				Reduce number of Blackberry PDA's. Presently 15 PDA's are assigned to SESD managers and supervisors at an annual cost of $14,275 ($951 each). Requesting, on a voluntary basis, those who do not regularly use these PDA's to turn them in could achieve a substantial savings.	

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings					Description	Comments
		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 4 - Athens, GA	3				X	Other Significant Initiatives	Reduction		Contracts Management	Option 1 - $29,640 / Year; Option 2 - $59,280 / Year				Security. Currently, there is one armed guard stationed 24/7 in the lobby of the SESD laboratory and one additional armed guard 12 hrs/5 days at the guard house controlling entry to the SESD property. Considering the low risk for the facility, possibly reducing guard coverage could achieve a savings without compromising employee safety. Option 1. If the guardhouse was staffed only 6 hrs/workday, an annual savings of approximately $29,640 could be realized. Option 2. Reducing guard coverage to only one guard 24/7 stationed in the laboratory lobby would eliminate security checks at the guard house of visitors and delivery trucks during the workday.	
Region 7 - Kansas City, KS	3		X	X		Other Significant Initiatives	Reduction		Purchase & Disposal					Continued consideration of reduction of chemical use in the analysis of samples. A detailed assessment of where, how much and what chemicals are used needs to be completed as a first step in the process. Once completed, the results of this assessment will provide essential information for use in considering alternatives and/or changes in operational procedures to reduce the amount of chemicals used and, thereby, potentially reduce the amount of hazardous wastes that would need to be disposed of.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	3				X	Other Significant Initiatives	Restructuring		Labor & Contracts Management					NEIC has received great benefit from the use of students, interns, and volunteers in the past. In the future NEIC will look to increase their contributions and examine the use of post-doctoral appointments.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

Laboratory	Category	Part(s) of Infrastructure Affected: F	E	P	A	Section	Focus of Project	Partner(s)	Type	Savings: $	Energy	Other	Reinvestment of Savings	Description	Comments
Region 10 - Manchester, WA	3				X	Other Significant Initiatives	Restructuring		Labor					The Region 10 Laboratory's long-term Staffing Plan calls for reducing the number of GS-14s, utilizing career development paths rather than hiring at the full performance level, workload redistribution to increase effectiveness (e.g., utilizing lower graded positions for routine extractions, glassware washing, etc.), and identifying unnecessary work.	Upon review of the circumstances surrounding this suggestion, the entry was found to be inaccurate. The expertise at the Region 10 Laboratory is heavily relied upon by EPA programs and the public to perform a large variety of complex analyses on difficult matrices such as tissues, provide technical support toward project planning, develop new analytical capabilities, provide oversight of state drinking water programs, and provide expert testimony during legal proceedings. The analyses often involve method development and research. Scientists with a great depth of knowledge and experience are needed to provide such support. The amount of work for the Region 10 Laboratory needing senior level staff is not expected to decrease anytime soon and is likely to increase. The recent selection of the Region 10 Laboratory by the Department of Homeland Security to be a chemical warfare agent pilot testing facility will require highly skilled and dedicated staff to meet the analytical demands during an incident of national significance.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	4				X	Other Significant Initiatives	Consolidation		Contracts Management					There is potential for efficiency, improved consistency and service, and potential cost savings through centralized support of several support functions. These improvements go well beyond the Agency's laboratories, and extend to all EPA Facilities. These could be standardized on a National basis, and managed at a local level by one organization. Potential Areas for consolidated service include: i) information technology; ii) communications; iii) physical facility security; iv) property management; and v) human resources. Barrier: Agency philosophy, personnel, and funding.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings					Description	Comments
		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
ORD/NERL/Ecosystems Research Division - Athens, GA	4				X	Other Significant Initiatives	Consolidation		Contracts Management	Savings Not Yet Known				Combine facilities support (O&M, janitorial, security, grounds maintenance) with ORD/ERD and R4/SESD. Barrier: R4/SESD costs are included with the GSA property lease. ERD has a separate 8a contract.	
Region 10 - Manchester, WA	4				X	Other Significant Initiatives	Consolidation		Labor					In past years, the Region 10 Laboratory, which is collocated with the Washington Department of Ecology Laboratory, was able to recover some of the salary costs for those EPA staff providing facility-wide services (e.g., facility maintenance, health and safety program oversight, construction management, etc.). Barrier: A new OGC interpretation of OMB Circular 1-97 (1969) now precludes the Region from accepting this funding because the services provided by EPA staff are not deemed 'specialized or technical services'. The Laboratory continues to seek an approach that will allow the State to compensate EPA for the facility-wide services it provides.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 4 AND ORD/NERL/ Ecosystems Research Division - Athens, GA	4				X	Other Significant Initiatives	Consolidation		Contracts Management	Savings Not Yet Known				Combine ORD/ERD and R4/SESD Facilities Support. Currently, ERD and SESD accomplish facilities support (O&M, janitorial, security, grounds maintenance) through separate contracts. Possible savings could be realized by combining facilities support for the two laboratories. Barrier: R4/SESD costs are included with the GSA property lease. ORD/ERD has a separate 8a contract.	
Region 4 AND ORD/NERL/ Ecosystems Research Division - Athens, GA	4				X	Other Significant Initiatives	Consolidation		Contracts Management	Savings Not Yet Known				Coordinate Security Services. Barrier: Two separate security contracts, leased versus EPA owned facilities, armed versus unarmed guards, determination of actual level of risk at laboratory facilities, complicate quantifying alternatives. A campus approach to physical security is underway, and more cost efficient options will be evaluated.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	4		X			Other Significant Initiatives	Improvements in Efficiency / Upgrades		Labor					A modern LIMS system, integrated with automated instrumentation, offers great potential for labor savings in reduced oversight and manual data entry. This is in addition to technical benefits in improved speed, quality, and ability to communicate data electronically in a standard format. Barrier: Availability of adequate S&T funding.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings					Description	Comments
		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 4 - Athens, GA	4				X	Other Significant Initiatives	Improvements in Efficiency / Upgrades		Travel	$53,169				SESD staff and managers, located in Athens, GA, routinely attend meetings held at the R4 Regional Office (RO) in Atlanta. The costs in lost time traveling the 150 miles round trip Athens to Atlanta, gas used, and GOV costs are significant. Video conferencing capability exists at both the SESD laboratory in Athens and the RO. Barriers: Regional meetings held when ever possible using video conferencing.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	4			X	X	Other Significant Initiatives	Restructuring		Contracts Management					Since 9/11, security guard costs have become a significant expense to the programs. NVFEL uses the Federal Protective Services contract for guard services. This cost has escalated by double digits each of the last two years. If EPA could provide a national contact with standardized requirements for use by all regions that reduces the multiple layers of management currently in use, considerable cost savings are likely. Barrier: A national EPA contract for security guard services does not exist.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	4			X	X	Other Significant Initiatives	Restructuring							In a laboratory it is important that the analysts be allowed to vary their work hours. For instance, when it has taken several hours to calibrate an instrument it might make sense to stay an extra few hours and finish work on a batch of samples rather than shutting down a procedure for the night and redoing the calibration in the morning. Often this is a real time decision that does not allow for completion and sign-off of paperwork in a timely manner. A more institutionalized approach to the different Flexitime options could greatly increase the efficiency of the laboratory. Barrier: Intra-agency policy.	Type of savings not specified and no quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 10 - Manchester, WA	4				X	Other Significant Initiatives	Restructuring		Labor					Currently, high graded technical personnel spend a significant amount of time on administrative duties (e.g., completion of PeoplePlus, Travel Manager, etc.). Unlike the administrative staff that formerly performed these functions, technical staff is not as familiar with timekeeping and travel regulations, nor are they as proficient at these tasks because they are not performed frequently and are not a significant part of their jobs. As a result, technical staff takes far more time to complete this work than would clerical staff, who could accomplish the tasks at a much lower wage rate.	No quantification of savings provided. Barriers to implementation not specified. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other			
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	5a				X	Other Significant Initiatives	Consolidation		Contracts Management	Reduction in PBX costs from $35,000 in 1997 to $10,000 in 2007				While the concept of consolidating functions to improve efficiency and reduce costs should always be considered, R&IE has reduced costs and improved service by assuming functions in house, by forming new partnerships, and by eliminating services. For example, phone/PBX costs have dropped from 35K in 1997 to 10K in 2007. Service has improved and we have a new PBX, conference bridge, and desktop handsets.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	5a				X	Other Significant Initiatives	Improvements in Efficiency / Upgrades		Contracts Management	Reduction in contract support costs from $10,200 / Person in 1997 to $7,400 / Person in 2007				Prior to 1998, ADP support was consolidated for EPA Las Vegas, and R&IE had no LAN. As part of a 1998 renovation, R&IE developed a separate LAN to meet staff and mission needs. Although we have developed extensive new capabilities during this time, our contracted support costs for LAN and Help Desk functions have dropped, including support provided to EPA's HR office in Las Vegas. This includes costs associated with establishing and operating a second, independent Tribal Training Center LAN.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a	X				Other Significant Initiatives	Improvements in Efficiency / Upgrades		Contracts Management					Much of the system gains have come because we have a rigorous preventative maintenance program for the building automation system (DDC/BAS). There are weekly checks of valves settings, actuator strokes, filters and equipment operation by the DDC vendor has prevented equipment from running needlessly out of setpoint conditions.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	5a				X	Other Significant Initiatives	Restructuring		Labor			2 FTEs (replaced with SEEs)		National Pesticide Standards Repository (NPSR): The ACB has saved FTE positions, salary, and benefit costs by hiring Senior Environmental Employees (SEE) for two positions in the NPSR. The two SEE employees work on a part time basis as contractors rather than as full time government employees.	

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings	
ORD/NERL/Environmental Sciences Division - Las Vegas, NV	5b				X	Other Significant Initiatives	Consolidation		Contracts Management	$100,000 / Year minimum from reduction of support staff				All ORD help desk call centers have been consolidated into a single ORD call center. Additionally, all remote locations have consolidated server rooms. Voice, e-mail, and the issuance and control of EPA access/ ID cards, as well as limited Wide Area Network/Local Area Network (WAN/ LAN) support for all EPA-Las Vegas colocated staff in Las Vegas, NV is already provided by ORD/NERL-Las Vegas. An additional savings could be realized by continued consolidation of IT support services. The ORD contractors are teamed and managed in IT specialty areas that support all locations across ORD. This provides a great deal of technical expertise that can be made available to every location without additional cost to ORD. In Las Vegas, colocated AA-ships operate two separate help desks, two incident ticket systems, and two sets of IT support contracts. If the EPA-LV colocated units migrated to share the ORD Consolidated Call Center, both of the redundant call centers in Las Vegas could be eliminated. Additional consolidation and sharing of ORD resources could eliminate the need for additional support staff.	
ORD/NERL/Environmental Sciences Division - Las Vegas, NV	5b		X			Other Significant Initiatives	Consolidation		Maintenance	$2,000,000 ORD-wide in first year of consolidation				Currently, EPA is moving to a single standard desktop PC configuration and image. Migrating to Active Directory (AD) and eliminating Novell could lead to an additional cost savings that could be realized by all EPA locations. PC desktop standardization greatly reduces the cost of software and hardware maintenance, allowing routine processes to be administered remotely and concurrently across all servers and desktops.	
ORD/NERL/Environmental Sciences Division - Las Vegas, NV	5b				X	Other Significant Initiatives	Consolidation		Contracts Management			1 FTE; OARM oversight costs		Currently, ORD and OAR each have individual Simplified Acquisition Contracting Officers (SACOs) which could easily be combined to eliminate the need for one FTE and reduce OARM oversight costs. Additionally, only one SACO audit would need to be performed in Las Vegas.	

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		F	E	P	A					$	Energy	Other			
ORD/NERL/Environmental Sciences Division - Las Vegas, NV	5b				X	Other Significant Initiatives	Consolidation		Contracts Management			1 FTE; OARM oversight costs		The colocated EPA entities in Las Vegas could benefit from consolidating administrative support services. For example, ORD, OAR, and OSWER each have separate safety, health, and environmental management programs. These services could be consolidated, eliminating the need for one FTE and reducing OARM oversight costs. Other administrative functions which could potentially be leveraged for Agency cost savings are records management, general clerical, and quality assurance.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	1		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase					The lab uses R&IE specific, local, and national level BPAs for purchase of supplies, equipment and services. These save time in administration and oversight, as well as negotiating favorable pricing. Examples include: Ludlum Instruments - radiation instrument calibration; GovConnection - computer hardware; bottled gases and liquid nitrogen; Oracle - software; and Corporate Express - green office supplies.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1				X	Purchasing / Strategic Sourcing	Equipment Procurement	Cincinnati Procurement Operations Division	Purchase			Time for new requirement		Partnering with the Cincinnati Procurement Operations Division, NVFEL was able to pre-approve multiple vendors for use in an Indefinite Delivery Indefinite Quantity (IDIQ) contract. This tool significantly reduces the costs and time for individual procurement actions, and streamlines the timeline for a new requirement.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	1				X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase	$30,000 / Year by negotiating new BPAs; $36,000 / Year by renegotiating gas BPA				NEIC put several blanket purchase agreements (BPAs) into affect which (1) reduced processing costs by reducing the number of individual purchases and (2) resulted in a 10% discount from the distributor. The estimated cost savings is about $30,000 annually. NEIC also rebid an existing BPA with an industrial gas supplier which resulted in a 5% cost of reduction for an approximated savings of $36,000 annually.	
OECA/OCEFT/National Enforcement Investigations Center - Denver, CO	2		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase	-				The Laboratory Supply Workgroup of the Agency's Strategic Sourcing Initiative is planning to develop national BPAs to provide high quality laboratory supplies at less expense. NEIC has been participating in this development effort and hopes to achieve cost savings for laboratory supplies.	

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Type	Savings			Reinvestment of Savings	Description	Comments
		F	E	P	A					$	Energy	Other			
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	2		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase					Continue to effectively manage the acquisition of laboratory supplies.	No information was provided regarding how this would be achieved or what the projected savings would be. FURTHER INQUIRY NEEDED.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	2		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase					EPA laboratories were tasked to implement a strategic sourcing strategy for the purchasing of laboratory supplies. Each organization with analytical operations, including NERL, analyzed its spending in specific commodities utilized in the laboratories. The information is used to make business decisions about acquiring these commodities more effectively and efficiently. The strategic sourcing of laboratory supplies would help laboratories to optimize performance, minimize price, increase achievement of socioeconomic acquisition goals, evaluate total life cycle management costs, improve vendor access to business opportunities, and otherwise increase the value of each dollar spent.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	2		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase					Strategic sourcing of laboratory supplies is expected to help laboratories optimize performance, minimize price, increase achievement of socio-economic acquisition goals, evaluate total life cycle management costs, improve vendor access to business opportunities, and otherwise increase the value of each dollar spent. The team has drafted a SOW and a pre-award conference is proposed for May 2007.	A table listing the cost of specific supplies purchased was included with this cost saving measure . However, no estimation of savings was provided.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Type	Savings			Reinvestment of Savings	Description	Comments
		F	E	P	A					$	Energy	Other			
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	2		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase	-				In response to OMB's initiative, the Agency created a Strategic Sourcing Team, with representatives from the Office of the Chief Financial Officer, the Office of Environmental Information, and the Office of Administration and Resources Management. In FY'06, this team identified laboratory supplies as one of the commodities/services that the Agency could strategically source. The Laboratory Supply Commodity Team is currently working on the contracting strategy. After much consideration of all acquisition options, the Team recommended the solicitation be awarded as a Blanket Purchase Agreement (BPA). The BPA would cover a five year period for the procurement of approximately $5 million of laboratory supplies each year. It is expected the use of this process will result in approximately $1 million of savings each year.	
Region 3 AND OPPTS/ OPP/Environmental Science Center, Fort Meade, MD	2		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase					Laboratory Supply Purchasing Contract Under the Federal Strategic Sourcing program. EPA is currently pursuing an initiative to develop Agency-wide contract mechanisms to procure lab supplies. The purpose of the Strategic Sourcing initiative is to "buy smarter" and ultimately save money. About a year ago a workgroup was formed of representatives from all Agency organizations that have labs. This workgroup has (1) defined lab supplies for purposes of this effort (2) studied how lab supplies have historically been purchased in EPA (3) conducted market research as to who has and can continue to provide these supplies, and (4) conceived an acquisition strategy that will lead to more efficient buying in the future. Currently, this effort is in the acquisition stage and hope to have one (or multiple) contract mechanisms awarded by the end of this fiscal year.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 5 - Chicago, IL	2		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase	-				Strategic sourcing of appropriate lab supplies and consolidation of chemical, glassware, and consumable items purchases to go into effect October 2008.	

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Type	Savings			Reinvestment of Savings	Description	Comments
		F	E	P	A					$	Energy	Other			
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	3		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase					Additional BPAs could be developed for supplies and services routinely purchased from the same supplier(s). Time savings for getting bids, and delay purchase orders could be substantial. Examples include: Radiation standards, chemicals, laboratory supplies, and portable equipment calibration services.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	3		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase					Under the Federal Strategic Sourcing program, EPA is currently pursuing an initiative to develop Agency-wide contract mechanisms to procure lab supplies. About a year ago a workgroup was formed of representatives from all Agency organizations that have labs. This workgroup has (1) defined lab supplies for purposes of this effort (2) studied how lab supplies have historically been purchased in EPA (3) conducted market research as to who has and can continue to provide these supplies, and (4) conceived an acquisition strategy that will lead to more efficient buying in the future. Currently, this effort is in the acquisition stage and hope to have one (or multiple) contract mechanisms awarded by the end of this fiscal year. There are two OAR reps on this workgroup.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	3		X		X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase					Additional BPAs could be developed for supplies and services routinely purchased from the same supplier(s) by the ORIA Radiation laboratories. Time savings for receiving bids, and delayed purchase orders could be substantial. Examples include radiation standards and radiation equipment.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	5d			X	X	Purchasing / Strategic Sourcing	Equipment Procurement		Purchase					Develop RERT standardization when possible with sister lab, FRMAC, National Buy purchases, and Superfund. Time and cost savings, by standardizing equipment and leveraging buying in volume and through National Buy BPAs. Standardizing equipment and operational readiness capabilities to increases "seamless" abilities of responders within the special teams and within the ORIA RERT).	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	5d		X			Purchasing / Strategic Sourcing	Equipment Procurement		Purchase	$30,000				The laboratory has saved money by acquiring used equipment (generators and trailers) from DOD.	

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		F	E	P	A				Type	$	Energy	Other			
ORD/NHEERL - RTP, NC	1			X		Resource Sharing	Chemical Sharing		Purchase	Up to $30,000 / Year				Prior to the NHEERL Toxicogenomics Core (NTC) each health division was purchasing their own reagents for gene expression analysis. In many cases the investigators could not qualify for discounts through bulk orders and/or the reagents were not used before their expiration date. The NTC now is the sole entity (for at least the health divisions) in purchasing reagents from Affymetrix. This allows better control over the use of the reagents minimizing or eliminating waste and allowing the NTC to take advantage of cost savings through bulk purchases.	The NTC was structured and implemented as a way to centralize toxicogenomic needs within NHEERL. The NTC accepts samples from scientists within NHEERL health divisions and ecology labs, analyzes gene expression on gene chips and returns to the investigator the raw data or analyzed data, depending on the needs of the investigator. The core consists of 4 scientists who carry out different aspects of the work and equipment for performing different genomic assays. The NTC was launched in October, 2006 and has carried out a number of projects for 4 health divisions and two ecology labs.
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1			X	X	Resource Sharing	Cooperative Lab Services	ORD/NERL	Analysis					NERL has had joint projects with NRMRL in which NERL scientists developed methodology which supported NRMRL research (e.g., pipe loop studies to determine organotin leaching and arsenic mobility studies in distribution systems). This type of research collaboration likely improved efficiency due to the joint location of the laboratories (enhanced communication) and the ability to directly work with each other (as opposed to other vehicles used to get this work done).	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	1		X		X	Resource Sharing	Cooperative Lab Services		Purchase					NERL/HEASD has established several Cooperative Research & Development Agreements (CRADAs). One agreement was developed with Waters Corporation and provided EPA with a LC/MS/MS system (Waters Corporation Seed Equipment (Sep-Pak® Concentrator, ACQUITY UPLC™ System, Quattro Premier™ XE, MassLynx™ Software)). The total value of the equipment provided to EPA for research under the CRADA is $420K. Another agreement was signed with Wako Pure Chemical Industries, Ltd. The cooperator is providing supplies, lab expenses and some project related travel for the total amount of $155 K.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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ORD/NHEERL - RTP, NC	1			X		Resource Sharing	Cooperative Lab Services		Analysis	Approx. $400 / Sample or $200,000 / Year over EA; Approx. $15,000 / Year (annual cost of contractor Gene Expression Analysis)				A number of NHEERL investigators previously used Expression Analysis (EA) for processing gene chips. EA typically charged ~$1000/sample which included the costs of the chips and reagents. The NTC charges only for the cost of the chips and reagents (~$600). In addition EA only gives the investigator the unprocessed data (or marginally analyzed data) whereas the NHEERL Toxicogenomics Core (NTC) will give the investigator up to a complete analysis appropriate for a manuscript.	The NTC was structured and implemented as a way to centralize toxicogenomic needs within NHEERL. The NTC accepts samples from scientists within NHEERL health divisions and ecology labs, analyzes gene expression on gene chips and returns to the investigator the raw data or analyzed data, depending on the needs of the investigator. The core consists of 4 scientists who carry out different aspects of the work and equipment for performing different genomic assays. The NTC was launched in October, 2006 and has carried out a number of projects for 4 health divisions and two ecology labs.
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1			X	X	Resource Sharing	Cooperative Lab Services	ORD/NRMRL	Services	$80,000				The Region 2 Laboratory provided ongoing analytical support to Office of research and Development (ORD) on several research projects requiring enumeration of Cryptosporidium and Giardia. The collaboration began with the analysis of combined sewage overflows from multiple sites throughout the eastern United States. The effort required method development that the Office of Water is proposing as an EPA standard method. The project success led to examining storm water runoff for these same parasites. More recently, the laboratories teamed in evaluating blending operations at wastewater treatment plants. This cooperation has proved valuable to ORD who lack this analytical capability in their Edison Laboratory. Sharing the laboratory function provides the necessary analytical quality control without establishing duplicate laboratory function. ORD estimates the cost to contract the analyses of 142 samples and associated QA samples to be about $80,000 Sharing this capacity across organizations will increase equipment utilization, prevent purchasing duplicate equipment, and allow targeting of extramural resources.	

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ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1		X	X		Resource Sharing	Equipment Sharing	Office of Ground Water & Drinking Water	Purchase					Both OGWDW/TSC and NERL/ MCEARD have shared equipment to develop analytical methods to support OGWDW's drinking water research needs. One project resulted in the development of a joint method for the measurement of perchlorate in drinking water (i.e., NERL scientists developed the method on equipment provided by OGWDW). An ongoing project by OGWDW is utilizing NERL equipment to improve methodology for haloacetic acids in drinking water.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	1		X	X		Resource Sharing	Equipment Sharing	ORD/NRMRL & ORD/NHEERL	Purchase					Field and laboratory equipment is shared. Researchers burrow equipment not in use from other labs/locations (e.g. NRMRL-Cincinnati provided some equipment to RTP for its bioavailability research). Currently, NERL shares some of its instrument capabilities with NRMRL and NHEERL which in return share their unique equipment and resources.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL/Western Ecology Division - Corvallis, OR	1		X			Resource Sharing	Equipment Sharing	NOAA	Purchase	$250,000				The Pacific Coastal Ecology Branch of the division worked collaboratively with NOAA in the EMAP Coastal assessment of the west coast, utilizing NOAA's ship, the McArthur II. At a cost of $20,000 per day, the EPA would have had to pay nearly $250,000 for ship time had there been no collaboration with NOAA.	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1	X				Resource Sharing	Equipment Sharing	OSWER/ERT	Purchase & Space	$50,000 in equipment; $2,500 in maintenance; $50,000 in labor				The Region 2 Laboratory has a main area that is dedicated to the washing of laboratory glassware. This glassware washing room is also used by the contractor laboratory that supports the Environmental Response Team (ERT). The shared service allows for the savings of the staff, equipment and space that would be required for a separate glassware washing area for ERT. The washer, including the water treatment system, and dryer cost approximately $50,000 and approximately $2500 annually to maintain. The personnel to operate the room cost approximately $50,000 per year. The sharing of the function permits optimal use of the equipment, space and staff for both laboratories.	

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Region 7 - Kansas City, KS	1		X	X	X	Resource Sharing	IT Infrastructure		Operations & Maintenance					The close proximity of the RSTC to the Regional Office has had significant advantages in terms of IT operations and support. While a significant cost, at the time, the two buildings are connected via fiber optic cable. This arrangement makes it practical to provide remote IT operations and support from the Regional Office eliminating the need for additional resources located in the RSTC to provide comparable services. Thus the administration of the Laboratory Information Management System (LIMS) resides in the RSTC.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1				X	Resource Sharing	Purchasing	Defense Energy Support Center, GSA, & VA Medical Centers	Purchase	Approx. $25,000-$100,000 / Year				Follow on contract is currently being developed by the Defense Energy Support Center (DESC) for natural gas. NVFEL has been using this contract mechanism to purchase natural gas since 1996. By combining our requirements with GSA and VA Medical Centers in Detroit and Saginaw, DESC is able to maximize volume discounts not available individually.	
OAR/OTAQ/National Vehicle & Fuel Emissions Laboratory - Ann Arbor, MI	1			X	X	Resource Sharing	Purchasing	OARM - Cincinnati Contracts Division	Contracts Management	$1,000,000				Fully integrated equipment contracts saved $1M in the NVFEL Certification Test Sites Modernization Program that would have cost $14M. Partnering with OARM's Cincinnati Contracts Division resulted in creative use of thorough performance specifications that required the equipment providers also ensure integration to all existing test site safety, facility and operational systems. Due to intense competition to win these contracts, some bidders performed all the integration work at no cost to the government. Coupled with clear incentives and disincentives, these contracts came in on time and below cost.	

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ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	1		X		X	Resource Sharing	Purchasing	ORD/NERL	Purchase					The pursuit of cross-laboratory and -division partnerships for capital equipment acquisitions. Recent examples of such action include the purchase of: (1) a DNA Analyzer in 2005 for approximately $325K that is used by NERL/MCEARD and NRMRL/WSWRD; and (2) a Real-Time PCR Thermocycler purchased in 2006 for approximately $90K that is used by NERL/MCEARD, NRMRL/ WSWRD, and OW/TSC. This efficient approach to acquiring large ticket items is promoted by giving high priority to capital equipment requests that demonstrate they would benefit multiple organizations. This "best practice" will continue to be utilized by the ORD capital equipment committee.	Although prices paid are given, no quantification of the actual savings is provided. FURTHER INQUIRY NEEDED.
ORD/NHEERL/Western Ecology Division - Corvallis, OR	1	X			X	Resource Sharing	Purchasing	DOE	Operations & Maintenance	$165,700 from 2005-2008 (Including Refurbishment Costs)				The division currently has an IAG with DOE to utilize the terracosm facilities at the Corvallis main campus not currently needed for research by the division. In this IAG, besides recuperating operational costs, the division obtained one-time recovery of refurbishment costs of the terracosms (which had been moth-balled).	
ORD/NHEERL/Western Ecology Division - Corvallis, OR	1	X			X	Resource Sharing	Purchasing	USGS	Operations & Maintenance	$60,000 / Year				The division currently has an IAG with USGS to utilize facilities at the Willamette Research Station not currently needed for use by the division. In this IAG, we recuperate the operational costs of the facility, including maintenance, landscaping, utilities, etc.	
Region 10 - Manchester, WA	1				X	Resource Sharing	Purchasing	Washington State Department of Ecology	Analysis					The Region 10 Laboratory is collocated with the Washington State Department of Ecology. This arrangement is implemented through an Inter-agency agreement that allows the Region to utilize the skills of some of the Department of Ecology staff with specific analytical expertise (e.g. the State asbestos technician is able to provide peer review of the sole EPA asbestos analyst's data).	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 8 - Golden, CO	1			X		Resource Sharing	Purchasing	19	Purchase	$59,000 / Year				Vertere Chemical Inventory Group Purchase- annual technical support agreement providing benefits such as group web based training and development of Agency reports.	

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Region 6 - Houston, TX	1	X				Resource Sharing	Space Utilization	Customs & Border Protection	Energy & Space	Approx. $80,000 / Year due to sharing of facility expenses				CBP's Scientific Services Laboratory was located in New Orleans. Hurricane Katrina forced the relocation of their operations to Houston. Through a MOU agreement, CBP is utilizing laboratory space at the Region 6 Laboratory while going through the process of building a new facility. During this time facility expenses are being supplemented based on square footage usage by CBP. Also during this time, CBP chemists are collaborating with R6 chemists and sharing equipment and reagents where possible. CBP will share space with the Region 6 Laboratory at least two years. It is expected that the collaboration aspect of this relationship will continue after CBP moves into its new facility in the greater Houston area. Their association with the Department of Homeland Security could make them a valuable asset to the Region 6 Laboratory for any development of capabilities in this area.	
Region 7 - Kansas City, KS	1	X				Resource Sharing	Space Utilization	Ambient Air Monitoring Team	Space					A laboratory which is approximately 569 square feet is utilized by the Ambient Air Monitoring Team located in the Environmental Services Division. This team uses the space for setting up and operating reference instrumentation for checking air monitoring equipment for the entities operating the local area networks throughout the region. Also, the area is used for storage of equipment as well as providing a clean area for working on air monitoring equipment and instrumentation.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 7 - Kansas City, KS	1	X				Resource Sharing	Space Utilization	OECA	Space					Agriculture Information Center, OECA. This unit which consists of 2 permanent EPA FTEs, 3-5 part-time EPA employees and one contractor, occupies an area of about 1500 square feet. The space consists of two private offices, 4 open area cubicles, and a large room. The operations are administrative support in nature.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 7 - Kansas City, KS	1	X				Resource Sharing	Space Utilization	Ambient Water Monitoring Team & Water Compliance Team	Space					Approximately 550 square feet is used by the Ambient Water Monitoring Team and Water Compliance Team, both of which are also in the Environmental Services Division, and also serves as area for preparing for field investigations and inspections as well.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 7 - Kansas City, KS	1	X				Resource Sharing	Space Utilization	ASPECT Team, National Decon Team	Space					ASPECT Team, National Decon Team. This team consists of 2 EPA FTEs and 2 contractors. They occupy an area of approximately 300 square feet consisting of 4 open area cubicles. They also have the need for laboratory space for certain operations have been provided a small laboratory consisting of about 220 square feet.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	2				X	Resource Sharing	Space Utilization		Energy	$1,000 / Year	40 Million BTUs			Various on-site groups currently maintain records storage rooms at several locations on site. It is proposed to construct a central records management and storage room that will accommodate all of these functions. The proposed room would include secured high-density filing systems, space for a records management contractor, and facilities for controlled public access and photocopying. Consolidating this function would eliminate 4 to 6 contractor positions and free up approximately 1000 square feet of space. Estimated energy savings from this project are 40 MBTU per year and $1,000.	
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	3		X	X		Resource Sharing	Centers of Excellence / "Cores"	ORD/NRMRL & ORD/NHEERL	Purchase & Maintenance					As part of the Analytical Chemistry Center of Excellence, NERL/HEASD is planning a pilot to increase the ability to share analytical capabilities in RTP with NHEERL, NRMRL, and NHSRC. So far local contacts for each organization have been identified and conversations on how to implement the measure have started. The measure will be formalized through a memorandum of understanding. To get the laboratories started, a B & F request for a centralized lab glassware washing facility has been submitted. The facility will support NERL, NHEERL, NRMRL and NHSRC.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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ORD/NHEERL - RTP, NC	3			X		Resource Sharing	Centers of Excellence / "Cores"		Purchase, Operations & Maintenance	Approx. $10,000 / Year in reagents; Approx. $30,000 / Year in equipment maintenance agreements.				NHEERL Toxicogenomics Core (NTC). There is an opportunity for having centralized microarray resources within all of EPA. There is a smaller microarray core lab that also processes samples in NERL. Consolidating the cores could save in reagents and costs of equipment maintenance. There will be additional cost savings if only one lab purchases upgrades to the standard equipment.	The NTC was structured and implemented as a way to centralize toxicogenomic needs within NHEERL. The NTC accepts samples from scientists within NHEERL health divisions and ecology labs, analyzes gene expression on gene chips and returns to the investigator the raw data or analyzed data, depending on the needs of the investigator. The core consists of 4 scientists who carry out different aspects of the work and equipment for performing different genomic assays. The NTC was launched in October, 2006 and has carried out a number of projects for 4 health divisions and two ecology labs.
ORD/NHEERL - RTP, NC	3		X	X		Resource Sharing	Centers of Excellence / "Cores"		Purchase, Operations & Maintenance					NHEERL-ORD Analytical Chemical Core. An RTP workgroup within ORD's National Health and Environmental Research Laboratory looking at analytical chemistry support found that there was a persistent shortage of scientists available to meet the analytical chemistry needs of the laboratory and that specialized equipment was underused. The workgroup recommended that a consolidated analytical chemistry facility would increase analytical chemistry capabilities, be more efficient and make sure that NHEERL's resources and FTE are focused on the highest priority work. The target date for implementation is May 2007.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	3		X		X	Resource Sharing	Chemical Sharing	National Institute of Environmental Health Sciences	Purchase	$3,000 / Year				Collaboration with the National Institute of Environmental Health Sciences (NIEHS) to identify opportunities to utilize solvents distilled at NIEHS.	
Region 10 - Manchester, WA	3				X	Resource Sharing	Purchasing	US Navy Fuel Depot & US National Marine Fisheries Service	Purchase & Contracts Management					There may be some cost savings that could be realized by partnering on common purchases, contracts, etc., with the U.S. Navy Fuel Depot and U.S. National Marine Fisheries Service, both of which are located near the Laboratory.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 5 - Chicago, IL	3	X	X			Resource Sharing	Space Utilization		Purchase & Space					Satellite lab in Cleveland Office was closed in 2006. Glassware and some chemicals were transferred to the regional lab. Transforming the lab space to office space will reduce the rental cost for the office each year since office space is less costly than lab space. It will provide more usable work space for that facility.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 8 - Golden, CO	4		X	X		Resource Sharing	Chemical Sharing	DHS Water Quality Division	Purchase					Homeland Security/Water Quality Division is proposing a group purchase/distribution of ultra-dilute standards and Proficiency Evaluation samples for some analytical tests relevant to Homeland Security. Barriers exist for purchasing and managing this procurement and for commitment to Homeland Security support.	No quantification of savings provided. Barriers to implementation not specified. FURTHER INQUIRY NEEDED.
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	4			X	X	Resource Sharing	Cooperative Lab Services		Purchase, Analysis, & Space					It was suggested that the creation of interdisciplinary teams would increase efficiencies across the different laboratories. It would be helpful to develop a corporate view of ORD or EPA where labs & centers see each other as complimentary and not competitors. It was also suggested that roles for positions should be clearly defined and revised sporadically. If the role is obsolete, the function would be revised and personnel assigned to updated roles. Barriers: Current organizational structure and the particular operational cultures of each laboratory.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 8 - Golden, CO	4		X	X		Resource Sharing	Purchasing	6	Purchase					Six of ten regional labs use Premium ELEMENT. There may be some collective bargaining that could take place with this vendor with significant savings to the agency. Barrier: An agency representative to setup this purchase has not been proposed.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 6 - Houston, TX	4	X				Resource Sharing	Space Utilization	Customs & Border Protection	Energy & Space	Potential 10-20% reduction in rent & utilities				Opportunities to build a joint laboratory facility with CBP has been hampered by the lack of authority to make official efforts to procure new facility space. Barriers: The window of opportunity has been small, and the lack of ability to make a commitment to this project has caused it to fall out of the realm of possibilities. Potential cost savings could have been significant through sharing cost of common space (such as, conference room, reception, storage, mechanical/electrical rooms, HVAC use, etc). Other efficiencies would have been even more significant in energy savings for a new facility.	

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Region 6 - Houston, TX	4	X				Resource Sharing	Space Utilization	Texas Commission on Environmental Quality	Energy & Space	Savings Not Yet Known				Opportunities to build a joint laboratory facility with TCEQ has been hampered by the lack of authority to make official efforts to procure new facility space. Barriers: The window of opportunity is small for the next lease renewal of both facilities, and the lack of ability to make a commitment makes it more difficult to make any real progress before the next lease renewal. Another opportunity may arise in 2015 for TCEQ. Potential cost savings haven't been clearly quantified, but the cooperative arrangement currently in place (see later in document) would make this a logical choice, though there may be political barriers. Other efficiencies could be even more significant in energy savings for a new facility.	
Region 6 - Houston, TX	5a			X	X	Resource Sharing	Cooperative Lab Services	Resource Sharing		$192,400 / Year - $142,600 in annual salary for 2 GS-12 Chemists; $28,500 in annual overhead costs for 2 FTE; $14,100 annual lease cost for lab & office space ; $7,200 annual utility costs for lab & office space				A cooperative arrangement has been devised between the Region 6 Laboratory and the local TCEQ laboratory to perform certain wet chemistry testing for the Houston Lab in exchange for testing equipment. Prior to 1990, the Region 6 Laboratory and the Texas (now TCEQ) environmental laboratory resided in the same facility. This original arrangement allowed the TCEQ laboratory to perform all classical wet chemistry parameters for the Region 6 EPA Laboratory. In 1990 when the Region 6 Laboratory moved into a new facility, the TCEQ Laboratory moved into their own separate facility, and the relationship has continued through a revocable license agreement and the use of a hotshot delivery service to ship samples across town to their current facility.	These savings do not include one-time start-up costs for supplies and equipment, which could easily run upwards of $100,000. It is assumed that the equipment ($15-30K) provided to TCEQ by the EPA on an annual basis would offset some or all of the annual supply and instrument costs for these tests, so they were not included.
Region 7 - Kansas City, KS	5b				X	Resource Sharing	Centers of Excellence / "Cores"		Analysis					Particularly among the regional laboratories, the concept of centers of applied science or centers of excellence had more significance a few years ago. While certainly less recognized, this concept may still have some value for highly specialized analyses which involve very expensive instrumentation and highly trained personnel. RECOMMENDED	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	5b		X		X	Resource Sharing	Chemical Sharing	NIST, DRI, & the University of Wisconsin	Purchase	$45,000-$50,000 / Year				EPA-NERL/HEASD, NIST, DRI, and the University of Wisconsin came together due to a common need: organic speciation standards. Each participant invested a minimal amount or resources ($20K) to develop the needed standards. Once the standards were developed each organization was able to obtain the standards without cost. The knowledge gained from this process is considered invaluable. RECOMMENDED	
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	5b		X	X	X	Resource Sharing	Cooperative Lab Services	NRMRL	Analysis	$20,000				NERL-RTP has several examples where working with other collocated labs has resulted in cost savings. An example is apportionment work done with NRMRL. NERL had an instrument that NRMRL needed. NRMRL had the standards that NERL needed. The two labs came together to perform the organic speciation work and shared what they had. They also shared the cost of a student. NERL saved $ 20K in the process of performing this research. RECOMMENDED	
ORD/NERL/HEASD & OAR/ OAQPS - RTP, NC	5b				X	Resource Sharing	Purchasing		Analysis					There is an agreement with GL Sciences that is estimated to provide the agency with estimated $ 71K in-kind contributions for a perfluorinated compounds project. An agreement with R. J. Lee Group is also in place for microscopy research and is estimated that the in-kind contribution would be $ 100K. RECOMMENDED	
OAR/ORIA/National Air & Radiation Environmental Laboratory - Montgomery, AL	5d			X	X	Resource Sharing	Cooperative Lab Services	ORD/ORIA, ORD/ NHSRC, & OEM						ORD - ORIA , OEM and ORD's National Homeland Security Research Center (NHSRC) signed an MOU in which NAREL serves as a Radiological Reference Laboratory for fixed radiological laboratory activities and issues in support of NHSRC . We are currently developing rapid methods for select radionuclides primarily to support the Agency's incident response capabilities	Type of savings not specified and no quantification of savings provided. FURTHER INQUIRY NEEDED.

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OSWER/Environmental Response Team - Edison, NJ	5d			X	X	Resource Sharing	Cooperative Lab Services	ORD/NHSRC, DOD, & DHS	Analysis					REAC chemists, in conjunction with EPA, DOD and DHS, conducted real-time ambient air perimeter monitoring around several buildings to accurately measure any fugitive emissions from the chlorine dioxide fumigation systems used to treat Bacillus species spores. With EPA ORD and the Decontamination and Management Division of the NHSRC, REAC analytical personnel provided a means to transport sorbent tubes in and out of Canada, provide analytical subcontracting of TO-17 and TO-11 analyses, validate critical data and assist with the preparation of the Quality Assurance Project Plan for a decontamination exercise of building material coupons inside of a trailer. Prior to mobile air monitoring, REAC chemists developed and validated methodologies using MS/MS to accurately measure in real-time any potential emissions that may pose a risk to human health or the environment. Cost savings and efficiency were improved through cooperation and consultation with multiple agency resources and focusing on a goal-oriented effort.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 9 - Richmond, CA	5d			X	X	Resource Sharing	Cooperative Lab Services		Purchase, Analysis, & Disposal					The Regional Laboratory network has a long history of providing assistance if a Regional Laboratory is unable to accommodate a request within their region due to either capacity or capability limitations. Among other things, this cooperative relationship means that when it is not feasible for a regional laboratory to develop its own analytical capability, it can rely on the network to provide analyses when needed. In FY 2006, the Region 9 Laboratory provided TPH analyses for samples from Region 5. In turn, the Region 5 Laboratory provided analysis for semi-volatiles by Method 625 for samples from Region 9. In the past, the Region 9 Laboratory has also made arrangements with the Region 7 Laboratory to perform analysis of air samples for dioxin and has received analytical assistance from the Region 1 Laboratory when the ICP-MS at the Region 9 Laboratory was down for repairs.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
OPPTS/OPP/ Environmental Chemistry Laboratory - St. Louis, MS	1			X		Water Conservation	Lab Equipment		Water					Added plastic washing tubs into the laboratory sinks to reduce the volume of water used in the cleaning of laboratory glassware and equipment.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings					Description	Comments
		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
ORD/NRMRL/Ground Water & Ecosystems Restoration Division - Ada, OK	1		X			Water Conservation	Lab Equipment		Energy & Water			12,600 Gallons of Water / Year		The GWERD laboratory glassware washer was replaced in 2004. Specifications for the new glassware washer included the requirement that "Each water fill must not exceed 9.25 gallons." The purchased system uses 9.1 gallons of water per fill. The old washers use 12.6 gallons per water fill. In a wash routine utilizing 5 fills, this difference translates into 17.5 gallons each time the washer is used. If the washer is used 15 times a week for 48 weeks, this would translate to savings of 12,600 gallons of water per year. Low water consumption also means reduction in electrical cost to heat the water, less detergent needed for each cycle, and lower sewage costs.	
Region 10 - Manchester, WA	1		X	X		Water Conservation	Lab Equipment		Energy & Water	$1,500 / Year				Reprogrammed the autoclaves so that they do not run water through the systems continuously but only during use. Installation of a water-saving valve in one of the autoclaves has further reduced water use.	
OAR/ORIA/Radiation & Indoor Environments National Laboratory - Las Vegas, NV	1	X				Water Conservation	Landscaping		Energy & Water					Desert xeriscape landscaping incorporated into new Secure ER Asset Building. Scheduled for occupancy in 2007.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 1 - Chelmsford, MA	1	X				Water Conservation	Landscaping		Energy	Not Possible to Estimate				NERL's landscaping design and maintenance program follows water conservation and environmental protection principles, which do translate into cost savings. The Laboratory's lawn is a natural system with mostly native grasses, wild flowers, and shrubs. The landscaping is adapted to the local climate, with little additional water, minimal cutting, and no fertilizer or pesticides. This program of no watering, no chemicals and only cutting the grass yearly clearly reduces pollution (e.g., air pollution and pesticide runoff) and helps create habitat for wildlife. It also helps save money, by reducing the manpower, gasoline, chemicals and water needed to maintain the landscape. Unfortunately, it has not been possible to estimate the cost savings.	

Laboratory	Category	Part(s) of Infrastructure Affected: F	E	P	A	Section	Focus of Project	Partner(s)	Savings: Type	$	Energy	Other	Reinvestment of Savings	Description	Comments
Region 4 - Athens, GA	1	X				Water Conservation	Landscaping		Water	Savings Not Yet Known				A water moisture sensor was installed in September 2006 which controls when the automatic lawn sprinklers are activated. In addition, the constant flow of water supplied to the fish preparations lab was disconnected, and is now turned on only when it is necessary for use. At the same time these water management initiatives were being evaluated, a leak was discovered that had been active for over a year. Consequently, savings attributable to the water management improvements cannot be quantified, since they are overshadowed by correction of the leak.	
OARM - RTP, NC	1	X				Water Conservation	Maintenance / Repair		Water & Maintenance	$24,5495.07 in potential water damage repair costs				On 18 March 2007 we had the unfortunate experience of having a faulty supply line to the Oracor De-Ionization System (DI) fail in Area E (E379A). The resulting water damage cost came to $27,277.23 to remediate the damages. We determined the cause of the problem to be supply pressure on that line. In turn we determined to install pressure regulators, to reduce supply pressure, and gauges on all DI supply lines. We are currently performing the work to install pressure reducing regulators and gauges on all DI supply lines. The work will cost an estimated $5,174.53 to complete. The potential savings in avoidance of water damage remediation due to the failure of these 9 systems is an estimated $245,495.07.	
OARM - RTP, NC	1	X				Water Conservation	Maintenance / Repair		Water & Maintenance	$1,500,000 in potential water damage repair costs				Our Facilities Division attended to the immediate remediation of areas affected by the failure of two hot water lines (Jan. 2006). They Replaced pressure fittings with threaded fittings and also performed preventive maintenance on all two hundred laboratory sinks on the main campus. They found 33 faulty hot water lines that could have resulted in similar catastrophic failures and extensive damage. The pressure fittings were replaced with threaded fittings for $4,201.25. The remediation of the damage caused by the two faulty water lines cost the EPA $91,000 to repair. By finding and fixing the 33 sinks we saved an estimated $1.5 Million in potential water damage remediation costs. Eventually all of our hot water lines were refitted with threaded fittings.	

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 10 - Manchester, WA	1			X		Water Conservation	Maintenance / Repair		Operations & Maintenance	$300 / Year		Reduction in time required for maintenance		By determining that maintenance staff was flushing eye wash stations at a greater frequency and volume than necessary, the Laboratory was able to change this procedure.	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1	X		X		Water Conservation	Maintenance / Repair		Water	$2,150 / Year		500,000 Gallons of Water / Year		In 2004 the preventive maintenance program for fire hydrants and fire sprinkler systems was modified to reduce the amount of time that the systems were flushed on a regular basis. The previous program called for each hydrant and sprinkler system to be flushed for 20 minutes. The new program calls for each hydrant and sprinkler main drain to be opened up fully and immediately shut down. The water supply system is then flushed from a single hydrant at the back of the facility. The savings from this modification are approximately 500,000 gallons per year and $2,150.	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1	X		X		Water Conservation	Maintenance / Repair		Water	$220 / Year		50,000 Gallons of Water / Year		The preventive maintenance program for showers and eyewashes was modified to decrease the amount of time each fixture is flushed. The previous program called for each fixture to be flushed for 5 minutes every week. The new program calls for verification of the operation of each fixture flushing for one minute every 2 weeks. The savings from this modification are approximately 50,000 gallons per year and $220.	
Region 7 - Kansas City, KS	1	X				Water Conservation	Maintenance / Repair		Water					The fire sprinkler system for the building is not charged, therefore, eliminating the need for flushing the system periodically. The system does not become charged with water until two detectors are activated simultaneously.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 7 - Kansas City, KS	1			X		Water Conservation	Maintenance / Repair		Water					The procedures for checking the operation of eye washes and safety showers was modified from requiring a 5 minute flush of each fixture to an operational check to verify proper operation and flow rates. This has significantly reduced the use of water for these tests.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A				Type	$	Energy	Other			
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	1	X				Water Conservation	Rainwater Recovery		Water	$4,500 / Year		1,040,000 Gallons Water / Year		The NRMRL/UWMB Laboratory contractor uses reclaimed storm water for research and development instead of using water from the facility water supply system. The purpose of this laboratory is to research storm water in the urban environment, so the reclaimed storm water is well suited for this purpose. If reclaimed storm water was not used it would be necessary to use treated tap water that had various chemical and filtering treatments applied to make it an accurate analytical replacement for storm water. The estimated savings from this program is approximately 1,040,000 gallons per year and $4500.	
Region 7 - Kansas City, KS	1	X				Water Conservation	Rainwater Recovery		Water					The RSTC was built with a rainwater collection system. The system consists of collecting the runoff from the roof drains in an underground 10,000 gallon storage tank. The water from this recovery system is used for toilet flushing and for supplementing the make-up water for the cooling towers.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/Environmental Sciences Division - Las Vegas, NV	1	X				Water Conservation	Reduced-Flow Fixtures		Water	$4,100 from 2004 to present; $9,600 Projected total savings from 2004-2011		825,000 Gallons of Water / Year		Several steps have been taken to reduce the water usage of the laboratory. These steps include replacing: i) thirty water closets and their flush valves with low flow motion sensitive units; ii) twenty urinals and their flush valves with low flow motion sensitive units; and iii) forty lavatory faucets with low flow motion sensitive units.	
Region 7 - Kansas City, KS	1	X				Water Conservation	System Water Recovery		Water			Approx. 600,000 Gallons of Water / Year		Recovery of condensate water from the building air handling units during the cooling season. The project consisted of re-piping the condensate water to a small holding tank from which the condensate water was pumped into the rainwater collection system.	
Region 7 - Kansas City, KS	1	X				Water Conservation	System Water Recovery		Water			Approx. 150,000 Gallons of Water / Year		Recovery of water from the reverse osmosis system. This project consisted of re-piping the flow of the backflow water from the reverse osmosis system to allow it to be pumped into the rainwater collection system.	
Region 10 - Manchester, WA	1	X				Water Conservation	Water Treatment		Purchase	$2,450 / Year				The Region 10 Laboratory has a number of water polishing units. The cartridges for these units have an expiration date of one year; however, the Laboratory continues to use them after this expiration date, provided water quality results comply with the manufacturer's specifications on performance. This cost saving equates to $2450/year (assuming an additional year of use for the seven cartridges).	

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		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 10 - Manchester, WA	1	X				Water Conservation	Water Treatment		Energy					The Region 10 Laboratory's water treatment program has been improved, increasing the efficiency of thermal transference and extending operational life of all water-related mechanical systems.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
ORD/NERL/Ecosystems Research Division - Athens, GA	2	X				Water Conservation	Water Use Management		Water	Savings Not Yet Known				Implement ERD's Water Management Plan -- Within the next two years ERD plans to implement recommendations in the plan which will save approximately 900,000 gallons of municipally supplied water per year. These actions include: i) replacing the existing autoclave; ii) upgrading sanitary fixtures; iii) installing air handler condensate recovery system; and iv) using on-site well for irrigation and cooling tower makeup.	
Region 6 - Houston, TX	3	X				Water Conservation	Landscaping		Water	<$100 / Year				Install a rain/freeze sensor and/or soil moisture indicator for the current 8-zoned lawn sprinkler system. Continue to practice water conservation practices. Continue to work with Lessor to develop additional xeriscape concepts (i.e., test beds front entrance) through current base lease agreement. Initial cost estimate $500.00.	
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	3	X				Water Conservation	Reduced-Flow Fixtures		Water					Installation of water savings faucets/ fixtures throughout the EPA Cincinnati facilities would save water consumption.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 7 - Kansas City, KS	3	X				Water Conservation	Water Use Management		Water					Continued exploration of additional options for reducing water usage. In order to proceed, a detailed water use study should be completed to verify water needs, to evaluate trends in water usage, and to ascertain water discharges throughout the facility. The results of such a study would provide critical information for evaluating potential water use reduction projects for consideration.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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Region 3 AND OPPTS/OPP/ Environmental Science Center, Fort Meade, MD	4	X				Water Conservation	System Water Recovery		Water					Reuse of Condensate Water. One of the condensates we have is water as a result of the steam we use to heat the building. Another condensate is the water that comes off the air handling units in the summer. Barriers: Unfortunately, the quality of the water is an unknown. It's not treated and it is potentially laden with any mold, bacteria, dirt and grime that it picks up along the way. It also may be considerably acidic depending on the air quality conditions outside. If we could treat it, the problem is storage capacity. The toilets would be a logical use for gray water. Unfortunately, the plumbing system changes to allow for gray water in the urinals and toilets isn't a quick and easy fix (i.e., the cost of the change is more costly than disposing of the water.) The discharge from any of the condensate systems is all inconsistent and periodic. Planning and managing them to be reused is not always cost efficient.	No quantification of savings provided. FURTHER INQUIRY NEEDED.
Region 3 AND OPPTS/OPP/ Environmental Science Center, Fort Meade, MD	4	X				Water Conservation	System Water Recovery		Water					Reuse of Deionized (DI) Water. When we run the system there is about 2 gallons/minute of water that is used to flush the reverse osmosis part of the system so that we can continuously deliver 17 MO water. Up to roughly 1,300 gallons per day could be generated, but we are not sure how we can reuse the water that is used for the DI. Barriers: It can't be added to our domestic water supply, and it can't be used for our other closed loop systems. We don't have a large storage capacity for this water, and we'd have to invest in some type of plumbing to move it to where it would be used in the building. Not a cheap option. We may be able to engineer a return of some of the water to the basement systems.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

Laboratory	Category	Part(s) of Infrastructure Affected				Section	Focus of Project	Partner(s)	Savings					Description	Comments
		F	E	P	A				Type	$	Energy	Other	Reinvestment of Savings		
Region 4 - Athens, GA	4	X				Water Conservation	Water Heating		Energy	$1,000 / Year				Hot water in the SESD facility is generated differently between two water systems. (1) one system consists of a men's and women's restroom and a break room . A 40-gallon gas hot water heater is used to generate hot water. (2) a second system provides hot water to two men's and two women's restrooms, with showers, and 36 laboratories. Hot water is provided by three 77 gallon boilers. The estimated hot water generation cost is $2,000/yr. Replacing these with gas tankless hot water heaters could achieve an estimated 50% savings or $1,000/yr. Barriers: Installation costs are estimated to be approximately $14,500. The SESD facility is leased, and approval would be required from the building owner. A more detailed evaluation would be required before implementing.	
Region 2, OSWER/ Environmental Response Team, AND ORD/NRMRL/ UWMB - Edison, NJ	5a	X				Water Conservation	Maintenance / Repair		Water	$1,700 / Year		400,000 Gallons of Water / Year		The water distribution system for the facility was replaced in 1996. This work eliminated several leaks that accounted for over half of the water consumed by the facility. Estimated savings from this work is approximately 400,000 gallons per year and $1,700.	
ORD/NERL & NRMRL/ Andrew W. Breidenbach Environmental Research Center - Cincinnati, OH	5a	X				Water Conservation	Reverse Osmosis / Deionization System		Energy & Water			Reduction in ratio of city water:distilled water from 8:1 to 1:1		Lab Water RO/DI System. Replacement of the original distilled water system with reverse osmosis, deionized water system. New system produces high quality lab water more efficiently, and eliminates the need to run a large boiler after hours solely to produce lab distilled water. This project resulted in significant water savings. Prior to installation 8 gallons of city water was required make one gallon of distilled. Since the installation the ration is now 1:1.	
Region 3 AND OPPTS/OPP/ Environmental Science Center, Fort Meade, MD	5a	X				Water Conservation	Reverse Osmosis / Deionization System		Water			500,000-750,000 Gallons of Water / Year		Revisited lab deionization water system with a constant reverse osmosis operation requiring back flush water. The reduced operations of the DI unit from 24/7 to 12 on 12 off and off during weekends saved approximately 0.5-0.75 million gallons per year.	
Region 3 AND OPPTS/OPP/ Environmental Science Center, Fort Meade, MD	5a	X				Water Conservation	Water Treatment		Water					Installed dry chemical feed to water treatment system for boilers and chillers. The previous wet chemical method used too much water. The new system reduced backflushing by allowing for tighter water quality conditions and allows for the introduction of biocides to reduce the potential for Legionella type material into the systems.	No quantification of savings provided. FURTHER INQUIRY NEEDED.

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		F	E	P	A					$	Energy	Other	Reinvestment of Savings		
Region 6 - Houston, TX	5d	X		X		Water Conservation	Landscaping		Water					Monitor and control outside watering system with greater efficiency. This could include installation of new zone controllers and monitoring systems/sensors. Current system is approximately 17 years old.	No quantification of savings provided. FURTHER INQUIRY NEEDED.