Table 10. Pollution Prevention and New Technologies for Environmental Protection (Continued)

Subtopic	Strategic Focus	Tasks	Products	Uses
Risk Management (Continued)	How can the performance of innovative technical solutions to environmental problems that threaten human health or the environment be verified?	Create technology verification entities for high-priority human health and environmental problems.	Performance verification of commercially available advanced environmental technologies and products.	To enhance the diffusion of environmental technologies, both domestically and worldwide. To increase the acceptance of innovative technologies by both regulators and the regulated community.

[a]NASA = National Aeronautics and Space Administration.
[b]DOE = U.S. Department of Energy.
[c]USGS = U. S. Geological Survey.

Appendix A

ORD's Long-Term Goals and Objectives

To help focus selection of research priorities, ORD has defined a set of long-term research objectives within each of the six long-term goal areas listed in Table 2. Variations in the specificity of the objectives listed below reflect differences in the maturity and complexity of the science underlying each objective. Many of the objectives include a set of activities (listed under the objective) that support the objective.

The goals and research objectives described here will assist decisions about research directions for years to come. Each year ORD senior management, working with the Research Coordination Teams, will apply ORD's priority-setting process to review current topics and identify specific new research topics that best further program goals and objectives. We would not expect to make major changes in priorities every year, but we will evaluate the continuing timeliness and importance of our research topics on an annual basis. The resulting set of research topics will constitute the basis for ORD's research program. ORD is currently refining its strategic goals and objectives to better align with Agency strategic planning and priorities.

The research objectives state, in a more specific and concrete manner than do the goals, what ORD will work to achieve in each of its focal research areas. We intend, after further refinement, to use the objectives and corresponding activities to introduce another level of accountability for results into the ORD planning process, as required by the Government Performance and Results Act (GPRA). Senior management will review the research objectives periodically to ensure that appropriate progress is being made toward their achievement, per GPRA. As necessary, adjustments in focus or approach will be made early on to avoid wasting time or resources. Once ORD has achieved its research objectives, we will devote resources to other high-priority areas. When new high-priority research areas are developed, we will craft new objectives as appropriate.

Goal 1: To Develop Scientifically Sound Approaches to Assessing and Characterizing Risks to Human Health and the Environment

Risk assessments and the associated risk management decisions are often based on limited data obtained in species or under exposure conditions that differ from real-world circumstances. Inevitably, scientists must extrapolate from these data sets to the human or environmental setting of concern to characterize human health or ecological risks. Extrapolation injects uncertainty into risk characterizations, which EPA relies on to develop risk management strategies and research priorities.

Greater certainty in risk assessment would improve the efficiency and effectiveness of EPA's risk management efforts and provide a better foundation for establishing the Agency's research priorities. ORD, therefore, will work to improve existing risk assessment data, methods, and models and to develop new methods for high-risk areas where data currently are inadequate.

Already, for example, the science has advanced sufficiently to warrant more refined approaches to risk assessment in several areas, including ecological impacts, effects on vulnerable subpopulations of people or environmental species, and noncancer effects in humans. As ORD develops improved methods, we will work with other parts of the Agency to ensure that these methods are credible and used in ways that are scientifically sound.

In recent years, we have begun to recognize the interdependence of ecosystems and to understand that we must consider the landscape as a whole to maintain the integrity of vital ecosystems into the next century. While continuing to develop and refine scientifically sound approaches to assessing risks to human health, we intend to expand our ecological research. For example,

we intend to study concurrent impacts of multiple anthropogenic and natural stressors and to develop techniques to examine nonchemical stressors. The results of this research—including enhanced data on and understanding of ecosystems at multiple levels of organization and geographic and temporal scales—will provide a scientific foundation for developing risk assessment/risk management strategies and techniques for restoring vital ecosystems (see Goal 3).

Objectives

Within this goal area, ORD will work to:

- Replace the current approach to assessing noncancer health risks with more scientifically grounded, biologically plausible approaches and models. This will include:
  - Studying the heightened sensitivity/susceptibility of certain subpopulations (e.g., children).
  - Studying the predictive relationship between toxicologic endpoints and human disease (e.g., to facilitate animal-to-human extrapolation).
  - Developing integrated mechanistic information to support biologically credible health assessments.
- Develop methods and models founded on measurement data and sound theoretical concepts that can be used to better characterize, diagnose, and predict total human exposures to chemical and microbial hazards, to improve and validate exposure models, and to reduce uncertainties in exposure assessments, risk assessments, and risk management decisions. This will include:
  - Determining the relationship between exposure sources and multiple exposure pathways, including characterizing the sources and determining the influence of transport, transformation, and fate on exposure.
  - Developing and evaluating an integrated mass-balance/multimedia/multipathway exposure model that incorporates state-of-the-science pollutant fate and transport process descriptions for use in risk assessment.
  - Developing and applying exposure measurement methods to reduce the uncertainty in exposure-dose relationships, especially analytical methods for identifying and enumerating microbial pathogens and biomarker and chemical marker methods for estimating site-specific exposures.
  - Continuing activity pattern research to reduce uncertainty in models and assessments that predict exposure levels, frequencies, and distributions in populations.
  - Delineating and quantifying the role of exposure in the development of effects in individuals and populations, including susceptible populations.
- Establish approaches to characterizing and understanding risks to ecosystems and, in cooperation with other agencies, develop a national, multiscale, integrated environmental status and trends program. This will include:
  - Developing indicators of the condition of representative ecosystems.
  - Supporting hypothesis-driven, long-term monitoring of important exposure and effects indicators at national reference sites.
  - Characterizing national land-cover/land-use patterns and developing measures of landscape condition at multiple scales for specific sites, watersheds, landscapes, and ecoregions.
  - Conducting pilot studies in ecologically important regions (e.g., the mid-Atlantic Highlands) to evaluate alternative monitoring designs and to develop techniques to integrate data across geographic scales.
- Understand and predict ecosystem exposures, responses, and vulnerabilities to high-risk chemical and nonchemical stressors at multiple levels of biological organization and geographic scales. This will require:
  - Developing ecological criteria for water (both freshwater and marine), air, soil, and sediment quality (1) as needed for the Agency's risk assessment and risk reduction efforts, and (2) to measure progress toward meeting environmental goals.
  - Developing diagnostic tools at all levels of biological organization for retrospective assessments and for characterizing the key sources and stressors in multistressed ecosystems.
  - Developing tools for predicting the vulnerability of ecosystems at multiple geographic and temporal scales to ecosystem stressors (e.g., climate change, altered land use, changes in air, soil, or water quality).

Goal 2: To Integrate Human Health and Ecological Assessment Methods Into a Comprehensive Multimedia Assessment Methodology

Human health risk assessments and ecological risk assessments have different histories at EPA and have traditionally been thought of as involving different disciplines. As a result, EPA has developed and used separate methodologies for those assessments. As we have begun to take a more integrated view of risk, however, we have noted that human health and ecological risk assessments actually make use of similar types of data and science. We have realized that we must use a more integrated, multimedia approach to risk assessment if we are to understand and reduce many current and future risks. We will therefore conduct research to develop an accessible, seamless, common methodology for combined human health and ecological risk assessments so that we can provide decision-makers at all levels with the integrated view of risk that they need to make sound decisions.

Objectives

Within this goal area, ORD will work to:

- Integrate fate and transport modeling techniques with biologically based models needed in human health and ecological risk assessment.
- Integrate human health and ecological exposure and trends monitoring research.
- Better understand the relationship between human health and the condition of ecosystems (e.g., to assess the impact of human consumption of contaminated fish or wildlife or the influence of landscape characteristics and climate interactions on disease vectors such as mosquitoes, ticks, and rodents).
- Develop tools and techniques to facilitate the assessment of relative risks to human health and the environment.
- Harmonize extrapolation methodologies for relating data on toxicity mechanisms for endocrine disruptors, immunotoxins, developmental hazards, and other chemicals with effects in sensitive human subpopulations, wildlife, and aquatic organisms.
- Improve extrapolation models by integrating toxicologic and mechanistic data obtained in laboratory and field investigations (epidemiology and ecology).
- Identify and validate wildlife species as sentinels for human health risks.

Goal 3: To Provide Common Sense, Cost-Effective Approaches for Preventing and Managing Risks

To enhance the practicality and cost-effectiveness of the products of ORD's risk management research, we are changing the way we study pollution control and prevention, contaminated site and spill remediation, and technology development. To the extent possible, we are integrating our air, water, and waste-related research, and we are increasingly focusing on emerging, high-risk problems—all so that we can better help regions, communities, and the private sector analyze pollution problems and achieve risk reductions efficiently and cost-effectively. This common-sense approach will seek to maximize the health and environmental benefits of risk management by focusing risk management research on those aspects of a process or situation that cause the greatest risks.

To that end, our pollution prevention and control research will now focus on multimedia life-cycle analyses, green technologies, and pollution prevention methods that small- and medium-sized companies can use to achieve significant reductions in risk across media. Our maturing site and spill remediation program will concentrate on developing cleanup options for complex risk situations and faster, lower-cost natural recovery systems. In addition, we will continue forging partnerships with the private sector to analyze high-risk needs and to develop, evaluate, and verify new pollution prevention and risk reduction technologies.

We have also begun efforts in ecosystem restoration and cost-benefit assessment. Our ecosystem restoration research (connected to that described under Goal 1 above) will focus on developing and demonstrating principles, technologies, and guidance materials that regions and communities can use to help restore local ecosystems. Our cost-benefit assessment research will focus on developing a systematic approach to identifying and reporting the benefits and costs of risk management technologies and alternatives. Such an approach is needed to satisfy the rapidly growing demand for cost-benefit analyses to support environmental decision-making—a demand engendered by the rising cost of environmental protection in an era of limited resources.

Objectives

Within this goal area, ORD will work to:

- Provide cost-effective risk management technologies and approaches for high-risk threats to human health and the environment. This will include:
  - Characterizing sources of fine-particulate emissions, air toxics, and ozone precursors, and identifying, adapting, and developing risk management approaches that control emissions to acceptable levels.
  - Providing cost-effective, reliable technologies and management approaches that reduce drinking water exposures to disinfectant by-products while protecting water supplies from microbial contamination.
  - Providing communities with proven technologies for wet weather flow watershed management, wellhead protection, and restoration of contaminated areas.
- Provide pollution prevention approaches and analytical tools to the private sector. This will include:
  - Providing risk-based systems and tools to analyze options for multimedia pollution prevention for major industrial sectors.
  - Identifying and evaluating the performance and costs for pollution prevention options for small- and medium-sized businesses.
- Develop advanced air quality simulation models that relate sources, emissions, and receptors. This will include:
  - Developing models based on high-performance computing systems to predict the fate of pollutants through the multimedia pathways leading to human and ecosystem exposure to these pollutants.
- Catalyze the development and use of cost-effective risk management approaches for the most difficult and costly environmental management problems. This will include:
  - Developing cost-effective techniques for characterizing and remediating soils and ground water contaminated with nonaqueous-phase liquids, chlorinated and other hazardous organics, and toxic metals.
  - Developing cost-effective techniques for characterizing and remediating contaminated sediments.
  - Verifying the performance of innovative risk reduction and measurement/monitoring technologies and accelerating their commercial use.
- Provide cost-estimating/engineering assessment tools and methods for more accurate and meaningful cost-benefit analyses. This will include:
  - Developing data standards and cost reporting protocols.
  - Developing methods and cost analyses for emerging, high-risk environmental problems (e.g., fine particulates, drinking water, wet weather flow controls).
- Develop and provide risk management alternatives to maintain and/or restore ecosystems. This will include:
  - Developing diagnostic and characterization methods and protocols for use in determining appropriate ecosystem restoration goals and requirements for specific sites, watersheds, landscapes, and ecoregions.
  - Identifying, testing, and providing risk management approaches and technical guidance for restoring riparian zones, remediating contaminated soils and sediments, and applying best management practices to restore or maintain ecosystems in urban, suburban, and urbanizing areas.
  - Developing methods to restore and maintain soil ecosystems.

Goal 4: To Provide Credible, State-of-the-Science Risk Assessments, Methods, Models, and Guidance

ORD continues to be a national leader in the field of risk analysis of human health and ecological effects and will continue to serve as a catalyst for advances in the science of risk assessment. ORD will achieve this goal by working to facilitate cooperation and the exchange of ideas between and among federal, state, and local scientists as well as scientists in the environmental, industrial, and academic communities. In addition, ORD will focus on three primary activities:

- Using an open and participatory process, ORD will conduct timely, state-of-the-art risk assessments. These assessments either will serve as prototypes

demonstrating new approaches to risk assessment or will respond to Agency needs by assessing multimedia, multiprogram, or contentious or sensitive issues.

- ORD will support other risk assessment efforts by providing guidance, consultation, training, and information products to assist colleagues, both inside and outside EPA, in conducting their own risk assessments. These efforts will respond directly to the needs of the risk assessment community and will target areas of uncertainty in the science and conduct of risk assessment.
- ORD will improve the state-of-the-science of risk assessment by developing scientifically sound and defensible approaches for incorporating and integrating data and models developed by ORD and the general scientific community into risk assessment efforts.

ORD will integrate human health and ecological concerns into all these activities.

Objectives

Within this goal area, ORD will work to:

- Prepare risk assessments for those stressors currently considered of high risk to humans and the environment. This will include:
  - Assessing ubiquitous pollutants in the air that affect human health (e.g., fine particles, ozone).
  - Assessing the risks associated with highly toxic and persistent environmental contaminants (e.g., chlorinated dioxins, mercury).
  - Assessing the risks to ecosystems from nonchemical stressors (e.g., habitat loss and UvB due to stratospheric ozone depletion).
  - Conducting comparative risk assessment of competing risks (e.g., those posed by microorganisms in drinking water versus those posed by disinfection by-products).
- Complete development of new cancer risk guidelines and other guidelines and provide support to the Program Offices and Regions to facilitate their implementation. This will include:
  - Developing and supporting the implementation of guidelines for assessing the ecological impacts of environmental stressors.
  - Supporting the implementation of new guidelines for cancer, neurotoxicity, and reproductive risks.
- Provide expert advice and technical support to EPA staff, other agencies, and EPA stakeholders. This effort will include:
  - Integrating scientific and technical information from ORD Laboratories and other sources to provide a sound scientific base and technical support for Agency decisions and policy.
  - Developing and supporting the implementation of guidelines for assessing the ecological impacts of environmental stressors.
  - Supporting the implementation of new guidelines for cancer, neurotoxicity, and reproductive risks.
  - Supporting chemical- and site-specific risk assessments for criteria air pollutants, hazardous air pollutants, waste sites, and drinking water.
  - Providing training in risk assessment to state and local stakeholders.
  - Continuing to support and improve the Integrated Risk Information System (IRIS) and expert systems such as Risk Assistant.
  - Assuring adequate quality assurance for all research, testing, and applications.
- Develop methods and assess methods developed by others for providing quality-assured data for environmental assessment. This will include:
  - Supporting the development of models that can be readily used by Regions and states.

Goal 5: To Exchange Reliable Scientific, Engineering, and Risk Assessment/Risk Management Information Among Private and Public Stakeholders

Effective risk assessments and risk management decisions depend on the availability of accurate sources of scientific and engineering data and information, risk assessments, analytical methods, and guidance. As a leader in the development of such methods and information, we are committed to providing, coordinating, and exchanging expertise and information to decision-makers inside and outside EPA. We will work to identify and fulfill user needs by providing appropriate tools and information through interconnected communication and technical support networks.

Our goal is to facilitate information that is impartial, up-to-date, and relevant to user needs. To that end, we must improve and update existing information systems and develop new systems and information transfer solutions to meet future needs. Working with other EPA offices, we will help to develop an operational communication and information transfer system for on-line scientific, engineering, and risk information that can be accessed by professionals or by members of the public who are involved in community-level analysis and decision-making.

Objectives

Within this goal area, ORD will work to:

- Provide current and relevant technical information to a broad user community. This will include:
  - Developing plain-language guidance and training that adequately and clearly communicate the appropriate use of technical information and that describe limitations and inappropriate applications.
  - Developing electronic communication and other information dissemination systems that can be accessed and understood by broad and diverse user communities.
- Complete the development of the new cancer risk guidelines and provide support to the Program Offices and Regions to facilitate their implementation.
- Maintain and increase support for existing scientific, engineering, and risk information systems. This will include:
  - Ensuring that current information resources are accurate, relevant, and up-to-date.
  - Developing electronic and other methods of bringing databases (e.g., IRIS, ECOTOX) to state and local governments and other stakeholders.
  - Developing data management systems that make data readily available to all ORD Laboratories and Centers, EPA Program Offices and Regions, and states.

Goal 6: To Provide Leadership and Encourage Others To Participate in Identifying Emerging Environmental Issues, Characterizing the Risks Associated With These Issues, and Developing Ways of Preventing or Reducing These Risks

With our very broad missions, we in ORD and the Agency as a whole must have some means of evaluating, comparing, and setting priorities for competing needs. We use risk as the common denominator for comparing divergent issues and making decisions. Our focus on relative risks and risk-based decision-making demands that we look beyond the obvious problems of yesterday and today to identify and assess issues just over the horizon; we must determine the potential risks that these issues pose and work to solve them. Often, however, few data exist to support assessments of emerging issues. Thus, we must develop and disseminate data and methods to permit credible decision-making in the face of very high uncertainty. At ORD, we are committed to working with other groups within EPA, the Agency's Science Advisory Board (SAB), the National Academies of Science and Engineering (NAS and NAE), and others to develop new ways of analyzing emerging issues. We recognize that ORD cannot and should not assume leadership in every area of environmental science. Our challenge is to be cognizant of where others are already leading and where ORD should undertake that role.

EPA's general approach to environmental management—assessing risks, evaluating the potential benefits of risk reduction, and devising risk management and risk reduction strategies accordingly—is increasingly being adopted by others in this country and abroad. More than any other organization, ORD has been in the forefront of developing the risk assessment and risk management methods that undergird this risk-based approach to environmental management.

More than any other organization, therefore, we should be expected to provide leadership in the development of new, more credible ways of comparing and ranking risks. In providing this leadership, we renew our commitment to encouraging and enabling others in the public and private sectors to participate in identifying, characterizing, and resolving emerging environmental issues.

Objectives

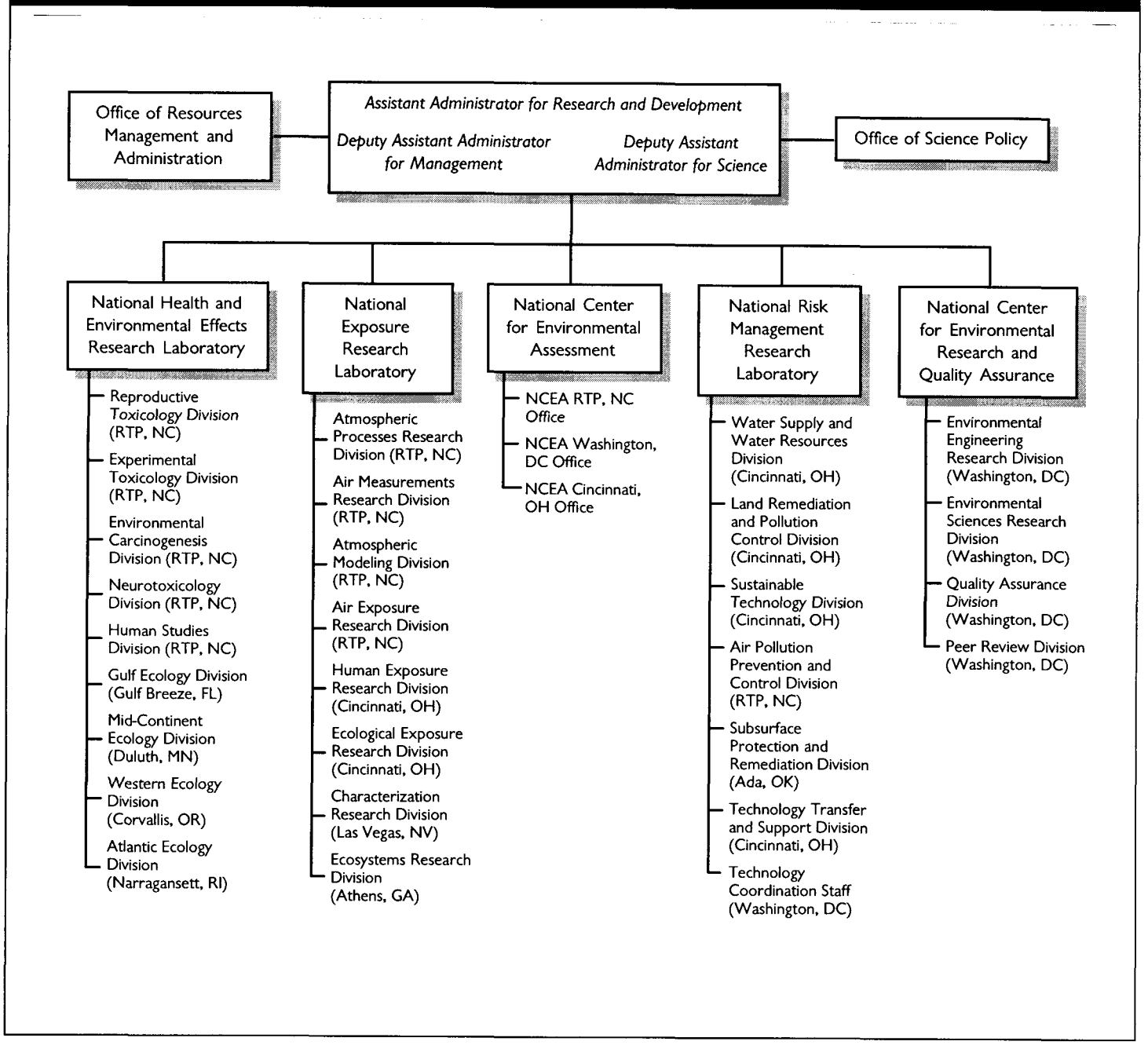
Within this goal area, ORD will work to:

- Collaborate with other parts of the Agency, the SAB, the NAS, and others to develop methods of identifying emerging issues and assessing their potential risks.
- Develop partnerships (via research grants, cooperative agreements, CRADAs, and other mechanisms) with other federal agencies, the White House Committee on Environment and Natural Resources, industry, and academia.
- Provide national and international leadership in risk assessment and its application for risk reduction and risk management.
- Conduct/sponsor workshops and symposia that will provide forums for stimulating interest and discussion on current or emerging environmental issues (e.g., endocrine disruptors), reaching consensus on crucial research needs, and defining the role of ORD and others in addressing those needs.

Appendix B
The ORD Organization

ORD's organization, depicted below, mirrors the risk assessment/risk management paradigm. The functions of ORD's National Laboratories, Centers, and Offices are described on the following pages.

ORD's Risk-Based Organization



National Health and Environmental Effects Research Laboratory

ORD's National Health and Environmental Effects Research Laboratory (NHEERL) performs laboratory and field research to help EPA answer two fundamental questions:

- What are the health and/or ecological effects of exposures to man-made stressors?
- What is the likelihood that these effects will occur under conditions of environmental exposure?

NHEERL's research contributes to improving three steps in the risk assessment process:

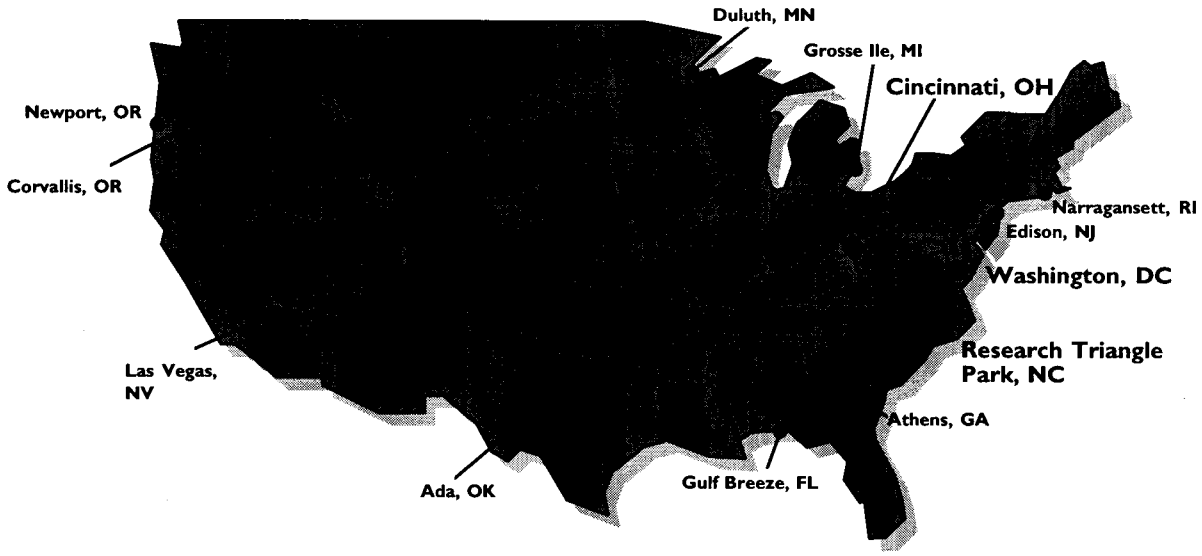
- In the ***hazard identification*** area, NHEERL works to improve both assessment test methods and the interpretation of data developed by these methods (i.e., the relationship of effects measures to health/ecological outcome).
- In the ***dose-response assessment*** area, NHEERL performs mechanistic research to address major uncertainties, as well as research to develop and improve extrapolation and multi-tier models.
- In the ***risk characterization*** area, NHEERL provides data on carefully selected priority problems.

National Exposure Research Laboratory

The work of ORD's National Exposure Research Laboratory (NERL) improves the scientific bases for human and ecosystem exposure assessments that are part of the risk assessment, risk management, and compliance processes. Researchers from NERL conduct methods, measurement, and modeling research to evaluate multimedia and multipathway exposures to a wide variety of physical, chemical, and biological stressors. They also apply their expertise to special problems, as in providing technical consultation to the Program Offices and Regions. The main components of NERL's program are:

- ***Source/Exposure Research*** focuses on investigating the emissions of chemicals from sources. Although most of ORD's research is in this category, NERL has unique expertise and interests here for sources that are part of the pathway of subsequent NERL exposure studies.
- ***Chemical, Physical, and Biological Process Modeling Research*** seeks to understand and predict chemical

Location of ORD's National Laboratories and Centers



and nonchemical stressor distributions. Major programs include fate, transport, and transformation research and advanced multimedia modeling.

- ***Environmental Characterization Research*** focuses on increasing understanding of stressors, receptors, and the related portions of the environment (e.g., ambient air, water, soil, biological quality, and a wide variety of microenvironments). Major program activities include landscape characterization, multimedia-multipathway human exposure measurement, and microbial identification and occurrence.
- ***Exposure Assessment and Analysis Research*** is conducted to estimate current and future exposures to humans and ecosystems. Major programs focus on developing total human exposure models and landscape assessment models.
- ***Exposure/Dose Research*** modeling provides the bridge between the exposures that occur and the dose to the target which ultimately can lead to effects. To improve the bridging and obtain data for the modeling, research collaborations with NHEERL exist.

National Center for Environmental Assessment

ORD's National Center for Environmental Assessment (NCEA) serves as the national resource center for the overall process of human health and ecological risk assessments and the integration of hazard, dose-response, and exposure data and models to produce ***risk characterizations***. Also, NCEA occupies a critical position in ORD between (1) the researchers in other ORD components who are generating new findings and data, and (2) the regulators in the EPA Program Offices and Regions who must make regulatory, enforcement, and remedial action decisions. Thus, NCEA is uniquely positioned to influence ORD's future research agenda to ensure that it addresses research needs identified by risk assessments and to serve as consultants to the Programs and Regions on the use of science in environmental decision-making. In support of these functions, NCEA focuses its work in three major areas:

- Development of methodologies that reduce uncertainties in current approaches:
  - Dose-response models and factors
  - Exposure models and factors
  - Probabilistic models
- Community-based risk assessment
- Assessments of contaminants and sites of national significance
- Guidance and support to risk assessors:
  - Databases
  - Risk assessment guidelines
  - Expert tools
  - Expert consultation and program support
  - Risk assessment training

Also, through the Risk Assessment Forum staff, NCEA is responsible for coordinating and implementing the health and ecological assessment activities of the Forum. These activities include scientific and science policy analysis of selected precedent-setting or controversial risk assessment issues of Agency-wide interest, such as risk assessment guidelines and development of cross-Agency positions on important risk assessment issues.

National Risk Management Research Laboratory

Research by ORD's National Risk Management Research Laboratory (NRMRL) provides the scientific basis for environmental risk management. Specifically, NRMRL conducts research to reduce the uncertainty associated with making and implementing risk management decisions. This research focuses on two important areas:

- Characterizing pollutant sources that require management.
- Identifying, developing, and evaluating tools and technologies for prevention, control, restoration, and remediation of environmental problems that are high risk, high cost, or that lack effective management alternatives.

NRMRL catalyzes the development and commercial application of some of the more cost-effective risk management alternatives through joint efforts with public and private sector partners, and through programs to verify the performance and cost of innovative technologies.

NRMRL also provides technology transfer and technical support to risk management stakeholders to encourage improved risk management decision-making.

National Center for Environmental Research and Quality Assurance

ORD's National Center for Environmental Research and Quality Assurance (NCERQA) represents a major and renewed commitment by ORD to help EPA achieve the highest possible quality of science. In particular, NCERQA has made a major commitment to ensure the high quality of ORD's extramural research by establishing the Science to Achieve Results (STAR) program. The primary purpose of the STAR program is to include the foremost research scientists from universities and nonprofit centers around the country in the ORD research program to meet the specific science needs of the Agency. STAR consists of four components—focused Requests for Applications, an Exploratory Research Grants Program, a Graduate Fellowships Program, and targeted Environmental Research Centers—all of which address issues of importance to EPA. All applications to the STAR program must pass rigorous external peer review by national experts before being considered for funding. A portion of the STAR program is conducted jointly with other federal agencies.

In addition to the STAR program, NCERQA manages the Environmental Research Centers Program and the Hazardous Substance Research Centers and provides managerial oversight of EPA's quality assurance programs. Finally, NCERQA has a major Agency-wide leadership and oversight role in peer review and quality assurance activities.

Office of Resources Management and Administration

The Office of Resources Management and Administration (ORMA) ensures that ORD's management operations promote sound science and efficient operations. Geographically dispersed and encompassing a wide array of scientific and engineering disciplines, ORD poses significant management challenges. ORMA, in partnership with ORD's Management Council, provides the administrative and operational framework integrating ORD's Laboratory and Center activities into a cohesive unit. Serving as the principal staff office to ORD's Senior Resource Official, ORMA provides leadership in budgeting, financial management, procurement, information systems, organizational development, facility operations, and infrastructure. In this capacity, ORMA independently evaluates ORD Laboratory and Center management, bench-marking success against the contribution of administrative processes toward the attainment of ORD's strategic goals.

Office of Science Policy

ORD's Office of Science Policy (OSP) is a bridge between ORD and its many constituents and is a key link between ORD science and EPA policies and regulation. OSP supports ***current*** Agency science needs by participating in ongoing regulatory and science policy activities of EPA's Laboratories, Program and Regional Offices, and the Agency-wide EPA Science Policy Council. OSP provides for ***future*** Agency science needs by leading ORD and Agency research planning activities. Working closely with ORD's National Laboratories and Centers and EPA's Program and Regional Offices, OSP coordinates their input into ORD's research agenda. Further, OSP provides scientific information, counsel, and assistance in policy formulation and other regulatory development activities. These functions all support strategic planning of ORD's research program.

In addition, OSP administers the Science Policy Council, a standing interoffice committee comprising senior EPA science managers and chaired by EPA's Deputy Administrator. Focusing on selected environmental issues that go beyond program and regional boundaries, the Council develops information and policies to guide EPA decision-makers in their use of scientific and technical information.

Appendix C

Management Structure for Implementing ORD's Strategic Plan

Successful implementation of ORD's Strategic Plan requires coordinated input and involvement by all ORD Laboratories, Centers, and Offices as well as EPA's Program and Regional Offices. Several councils and teams, illustrated and described below, provide mechanisms for this participation. Collectively, these groups involve all levels of ORD senior management from ORD's Assistant Administrator through to ORD's Assistant Laboratory Directors (see figure). The Research Coordination Council and ORD's Research Coordination Teams, described below, provide mechanisms for Program and Regional Office involvement. One of the important roles of the councils and teams is to assure upward communication from the experts in ORD's Laboratories and Centers.

Executive Council

ORD's Executive Council is chaired by ORD's Assistant Administrator and consists of ORD's Deputy Assistant Administrators for Science and Management and the Directors of ORD's National Laboratories, Centers, and Offices. The Executive Council serves as the primary decision-making body for major planning and management decisions. Based on input from the Management and Science Councils, Research Coordination Council, and Research Coordination Teams, the Executive Council coordinates major policy and budget issues across ORD, including consensus recommendations to ORD's Assistant Administrator.

Management Council

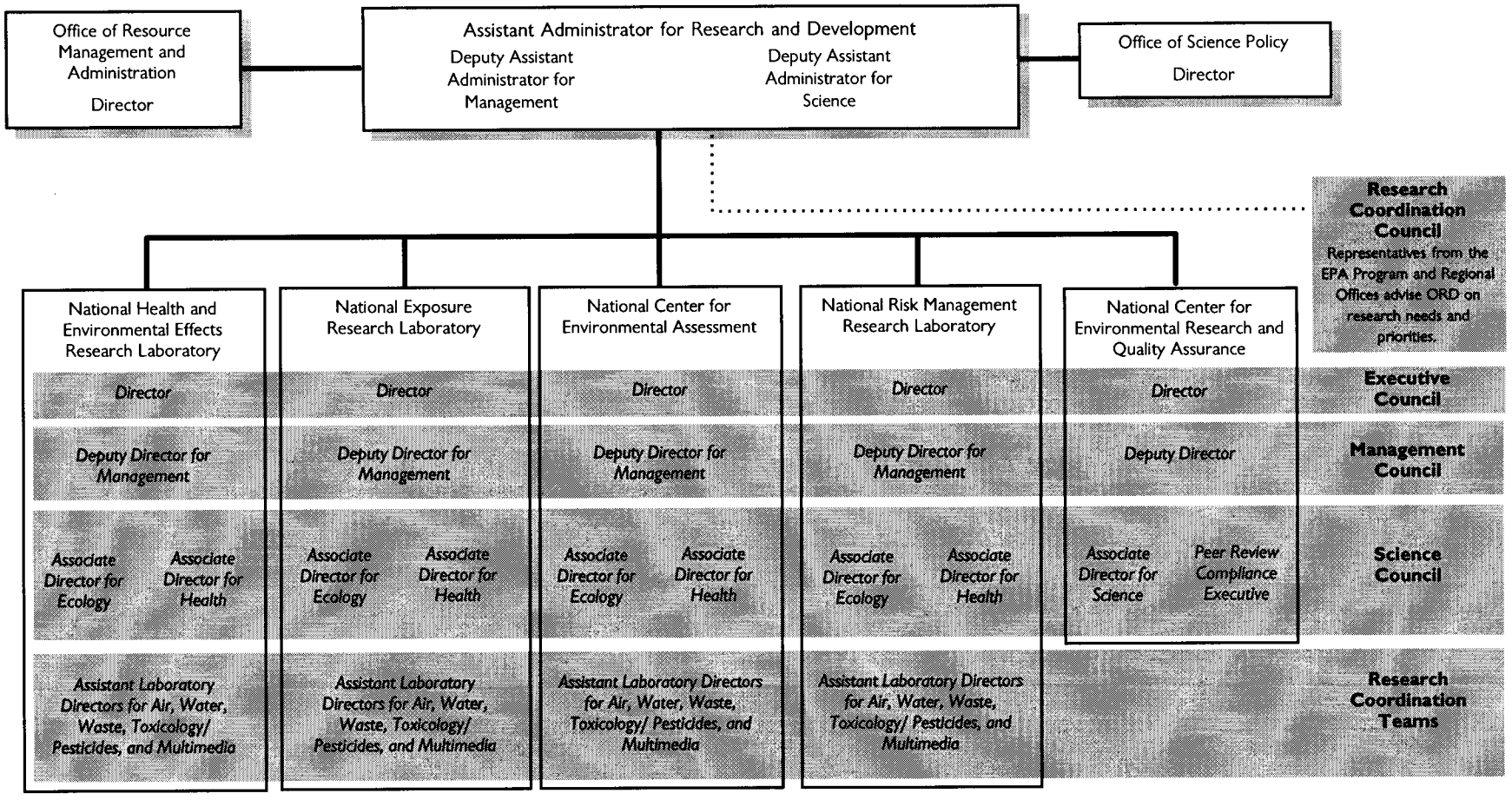
ORD's Management Council is chaired by ORD's Deputy Assistant Administrator for Management and includes the Deputy Assistant Administrator for Science as an ex officio member, the Director of ORD's Office of Resources Management and Administration (who serves as the Vice Chair), and the Deputy Directors for Management of ORD's Laboratories and Centers. ORD's Management Council provides senior management leadership for developing and implementing effective management policies, procedures, and systems. For example, the Management Council is leading the development of ORD's Management Information System, a management system to ensure that ORD's resources are efficiently administered. The Management Council also provides input, feedback, and guidance on issues that significantly affect ORD's overall management operations.

Science Council

ORD's Science Council is chaired by ORD's Deputy Assistant Administrator for Science and includes the Deputy Assistant Administrator for Management as an ex officio member. Science Council members provide a balance between health and ecological research. They include the Associate Directors for Health and Ecology of ORD's National Laboratories and Centers, the Associate Director for Science of ORD's National Center for Environmental Research and Quality Assurance, the Associate Director for Science of ORD's Office of Science Policy (OSP), and the Director of OSP.

The Science Council serves as the principal forum for identifying, discussing, and providing advice and recommendations to ORD's Assistant Administrator on scientific and technical issues that significantly affect ORD's overall scientific and technical operations. For example, the Science Council had the lead role in developing ORD's first Strategic Plan and will review all research plans.

ORD Management Structure



Human Resources Council

In fiscal year 1996, ORD established a Human Resources Council to provide guidance and direction to ORD management in implementing ORD's Human Resources Program. Chaired by an ORD Laboratory Director as the executive lead, the Council has 25 appointed employees who represent each ORD Office, Laboratory, and Center, with at least one representative from each geographical unit. The representatives reflect ORD's diversity in terms of job types, gender, ethnicity, and grade. In addition, the Council includes representatives from EPA's Human Resources Office; the labor unions who serve ORD Offices, Laboratories, and Centers; and EPA's Office of Civil Rights. ORD's Office of Resources Management and Administration provides staff support and serves as the executive secretary to the Council.

Research Coordination Council

The Research Coordination Council comprises the Assistant Administrators from key Program Offices and the EPA Regional Administrators, supported on a day-to-day basis by their senior staff. The Research Coordination Council serves as a focal point for integration between ORD and EPA's Program and Regional Offices. The Council provides ORD with a cross-agency perspective, participates in ORD's planning process, and recommends potential topics for ORD's research agenda and extramural grants program. The Council is supported by a steering committee made up of senior scientists from their respective EPA offices

Research Coordination Teams

The Research Coordination Teams coordinate ORD's research program with ORD's clients and across ORD Laboratories and Centers. Organized by environmental media (air, water, waste, toxics/pesticides, and multimedia), the teams assess ORD clients' needs, recommend research priorities, monitor ORD progress toward meeting these priorities, facilitate integration of intramural and extramural research activities, and ensure communication of results to ORD clients. Each Research Coordination Team includes a Team Leader from ORD's Office of Science Policy, the Assistant Laboratory Directors from ORD's Laboratories and Centers, a program analyst from ORD's Office of Resources Management and Administration, a representative from ORD's National Center for Environmental Research and Quality Assurance to provide input on ORD's grants program, and representatives from EPA's Program and Regional Offices. The Research Coordination Teams take the lead in developing ORD's science research plans and in organizing and conducting media-based program reviews of ORD progress and outputs.

Appendix D

Relationship of Fiscal Year 1997 STAR Focused Requests for Applications (RFAs) to ORD's High-Priority Research

	Safe Drinking Water	High-Priority Air Pollutants	Emerging Issues	Ecosystem Protection	Human Health Risk Assessment	Pollution Prevention and New Technologies for Environmental Protection
Ecosystems Indicators				●		
Issues in Human Health Risk Assessment, including human health effects of complex exposure patterns, variability in human responses to environmental agents, and consumer right-to-know					●	
Endocrine Disruptors			●	●	●	
Ambient Air Quality, including tropospheric ozone and fine particulate matter and urban air toxics		●			●	
Health Effects and Exposures to Particulate Matter and Associated Air Pollutants		●				
Drinking Water, including microbial pathogens in drinking water systems and drinking water disinfection by-products	●				●	
Contaminated Sediments			●	●	●	
Approaches to Multi-scale Ecological Assessment in the Middle Atlantic Region			●	●		●
Ecosystem Restoration				●		●
Ecology and Oceanography of Harmful Algal Blooms				●		
Arsenic	●				●	
Terrestrial Ecology and Global Change				●	●	
Water and Watersheds, including community-based research, and urban/suburban research	●			●	●	
Technology for a Sustainable Environment, including chemistry and engineering for pollution prevention, and measurement, assessment, and feedback techniques				●	●	●
Decision-Making and Valuation for Environment Policy, including benefits and costs of environmental policies and programs, ecosystem valuation and protection, and normative behaviors and environmental decision-making				●	●	●
Bioremediation				●	●	●

Appendix E

Relationship of Fiscal Year 1997 and 1998 Program Enhancements to ORD's High-Priority Research

	Safe Drinking Water	High-Priority Air Pollutants	Emerging Issues	Ecosystem Protection	Human Health Risk Assessment	Pollution Prevention and New Technologies for Environmental Protection
Fiscal Year 1997						
Drinking Water Disinfection and By-Products	●					
Particulate Matter		●				
Endocrine Disruptors			●			
Community-Based Environmental Protection and Ecosystems Research				●	●	
Benefit/Cost Research						●
Fiscal Year 1998						
Particulate Matter and Urban Toxics		●				
Endocrine Disruptors			●			
Global Change			●			
Contaminated Sediments				●		
Children's Health and Food Quality Protection Act					●	
Superfund						●
Advanced Measurement Initiative						●
Environmental Information for Communities						●

United States
Environmental Protection Agency
Center for Environmental Research Information
Cincinnati, OH 45268

Please make all necessary changes on the below label, detach or copy, and return to the address in the upper left-hand corner.

If you do not wish to receive these reports CHECK HERE ☐; detach, or copy this cover, and return to the address in the upper left-hand corner.

BULK RATE
POSTAGE & FEES PAID
EPA
PERMIT No. G-35

Official Business
Penalty for Private Use
$300

EPA/600/R-97/015