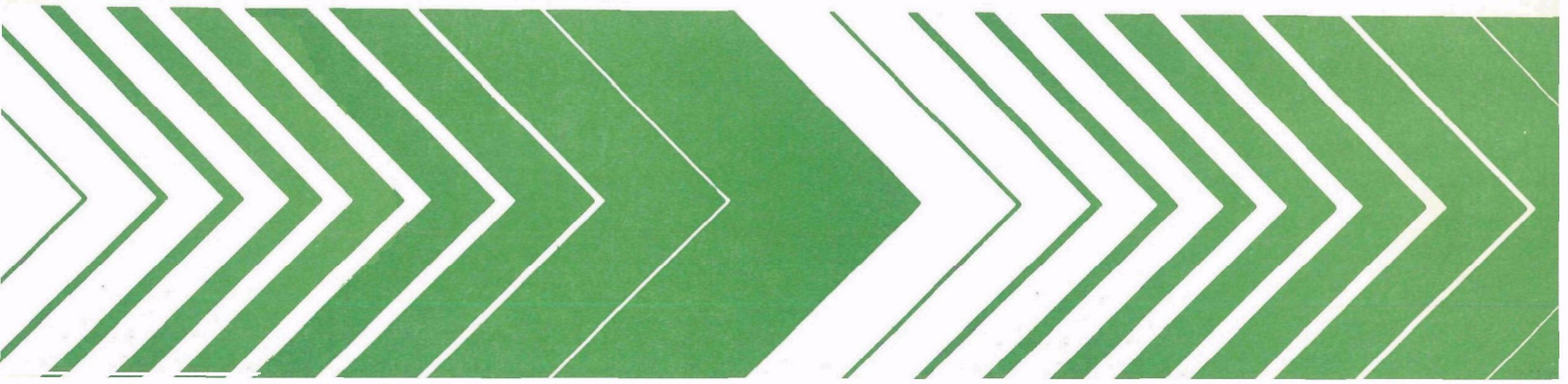


United States
Environmental Protection
Agency

Research and Development



The Office of Research and Development 1989



November 1988

U.S. Environmental Protection Agency

The Office of Research and Development

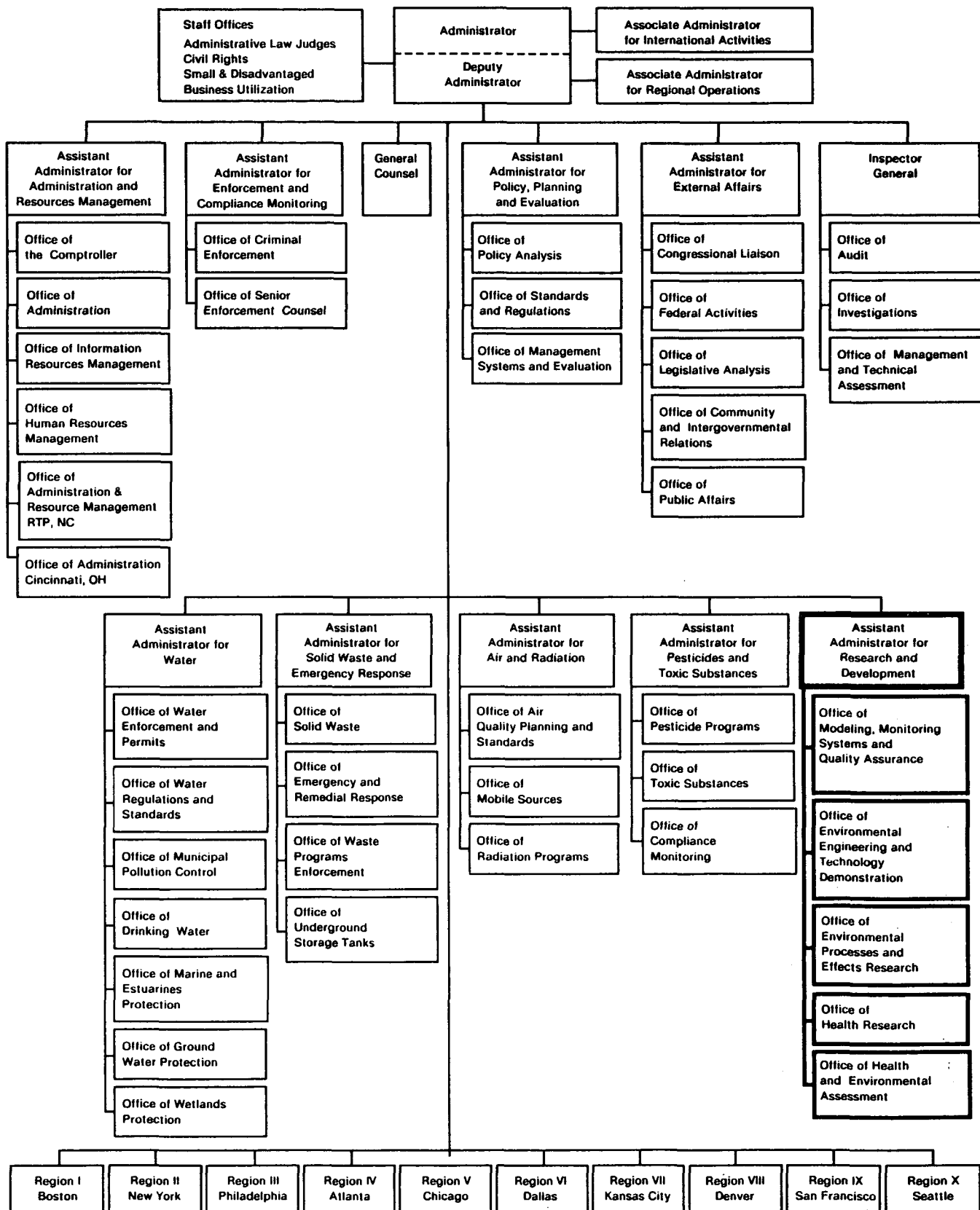
1989

**U.S. Environmental Protection Agency
Washington, DC, 20460**

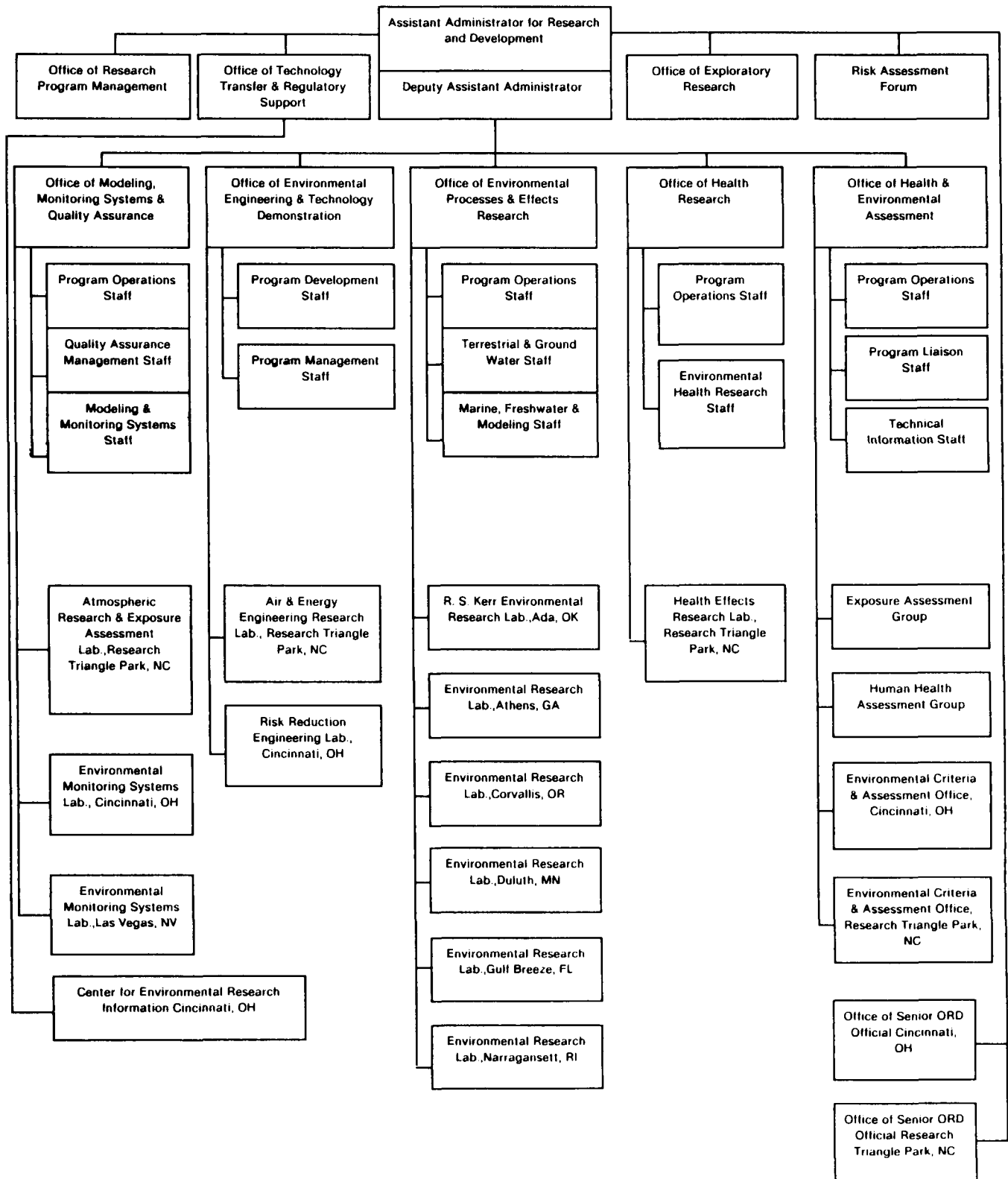
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U. S. Environmental Protection Agency Organization Chart



Office of Research and Development Organization Chart



Office of Research and Development



Erich W. Bretthauer is the Acting Assistant Administrator for the Office of Research and Development. From September 1987 through October 1988, he was the Deputy Assistant Administrator. Within EPA he has served as the director of both the Environmental Monitoring Systems Laboratory, Las Vegas, and the Office of Environmental Processes and Effects Research, Washington, DC. In 1962 he began his career in scientific research with the Public Health Service. He received bachelor's and master's degrees in Chemistry from the University of Nevada, Reno. He has authored many technical papers and has received the EPA Gold Medal.

Mission

Introduction

The primary goal of the U.S. Environmental Protection Agency is to mitigate the adverse impacts of pollution on human health and the environment. Toward that end, Agency management must make decisions regarding the development of policy, guidance, standards, regulations, and the appropriate tools for implementing pollution abatement strategies. It is the primary mission of the Office of Research and Development (ORD) to provide high quality, timely scientific and technical information in the service of Agency goals. The Agency's research program is conducted through 12 environmental laboratories across the country, employing some 2000 people, with an annual budget of \$380 million. The research focuses on areas targeted by the planning process as needing additional emphasis in order to provide the information required for Agency decision making.

Research Perspectives

The overall planning process engenders an applied research and development program focused on answering key scientific and technical questions related to EPA's decision making, short-term scientific and technical studies supporting immediate regulatory and enforcement decisions, and a longer-term research program that extends

the knowledge base of environmental science and anticipates environmental problems.

The core research and development program is focused on the following functional areas:

- Health effects research - to determine the adverse effects of pollutants on human health
- Ecological effects research - to determine the adverse effects of pollutants on ecosystems
- Environmental processes and fate research - to understand how pollutants are transported and modified as they move through soils, ground and surface waters, and the atmosphere
- Environmental monitoring research - to develop methods of identifying pollutants in the environment and measuring exposure to such substances
- Risk assessment research - to develop methods to integrate information on pollutant sources, fate and transport, exposure, and health and ecological effects in order to assess the overall risk posed by a pollutant or a group of pollutants
- Risk reduction research - to develop control technologies to treat, destroy, or contain pollutants and methods to reduce or

Office of Research and Development

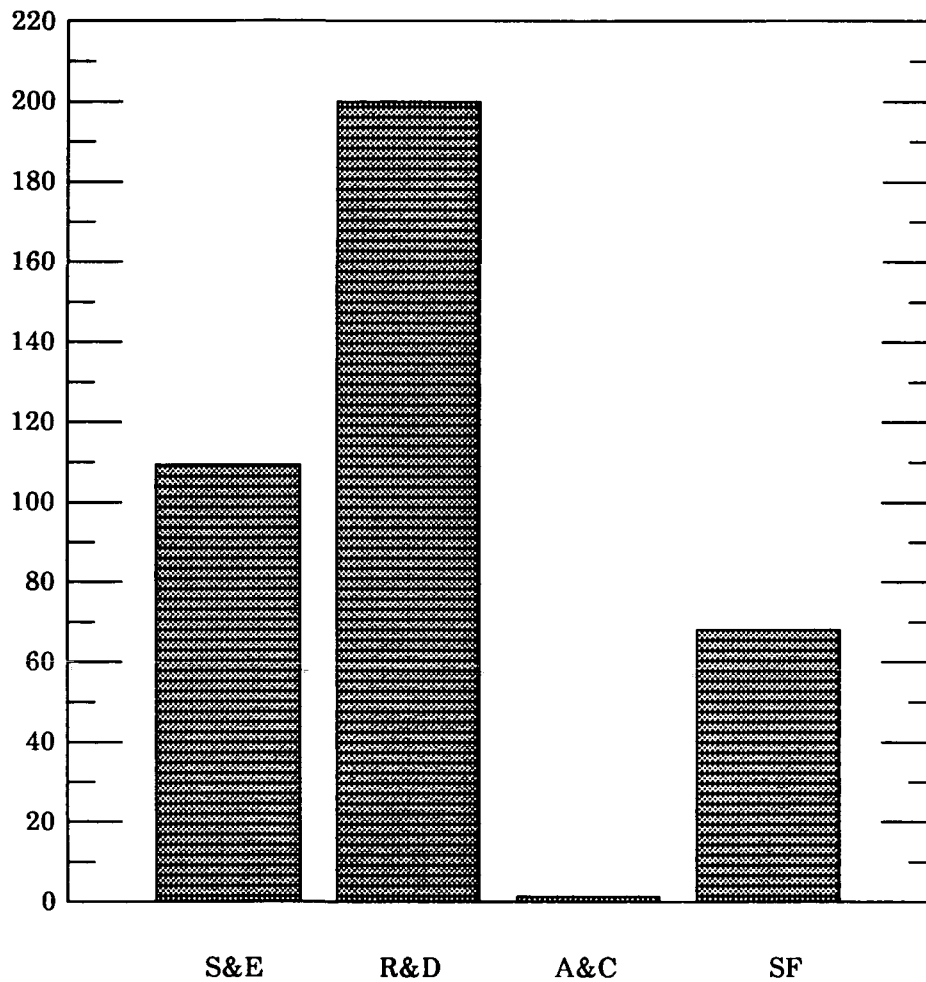
eliminate the sources of pollutants or to prevent exposure to pollutants.

In addition to functional areas, several cross-media problems also categorize the total ORD program. Those cross-media problems receiving special emphasis at present and for the foreseeable future and the Agency programs most concerned are:

- Global climate change (air, water, hazardous waste);
- Total and human exposure assessment (air, water, hazardous waste/Superfund, pesticides/toxic substances)
- Wetlands (water, hazardous waste and Superfund);
- Accidental releases (air, water, hazardous waste and Superfund);
- Comparative risk for complex mixtures (air, water, hazardous waste and Superfund, pesticides/toxic substances);
- Technology Transfer (all);
- Biotechnology (air, water, pesticides/toxic substances).

Office of Research and Development

FY 89 Resources



Total Full Time Employees: 1,857

Total Budget:

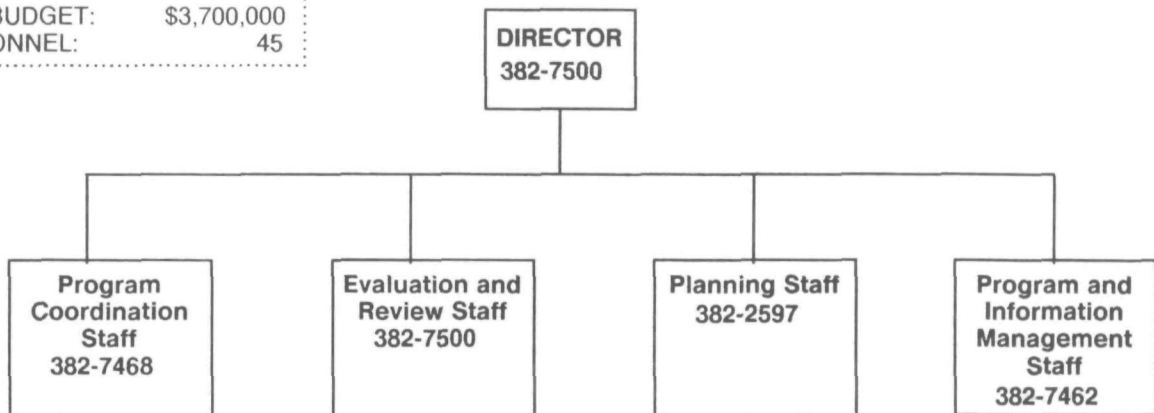
Salaries and Expenses (S&E)	\$109,799,000
Research and Development (R&D)	200,500,000
Abatement and Control A&C/Leaking Underground Storage Tanks (LUST)	1,768,000
Superfund (SF)	<u>68,224,000</u>
Grand Total	<u>\$380,291,000</u>

Office of Research Program Management



Clarence E. Mahan has been the Director of the Office of Research Program Management since April 1986. From 1983 to 1986, he was Associate Comptroller for EPA. Before that, he spent a year as the Director, Office of Fiscal and Contracts Management. He held several positions with the Army, the Air Force, and the Department of Energy. Mr. Mahan received an MBA degree from Syracuse University, a master's in History from American University, and a bachelor's from the University of Maryland. He has received the Presidential Rank of Meritorious Executive Award.

FY89 BUDGET: \$3,700,000
PERSONNEL: 45



Office of Research Program Management

Functions

The Office of Research Program Management (ORPM) is the principal staff office to the Assistant Administrator on matters of budgeting, accountability, program planning, analysis, review, integration and coordination, resource management, organizational and manpower management, environmental compliance, policy development and analysis, and administrative management services. The Headquarters Staff Offices responsible to ORPM are required to:

- recommend ORD policies, procedures and resource targets;
- administer planning, budgeting, reporting and review systems;
- determine ORD program responsiveness to Agency goals and measure performance;
- provide administrative support services to ORD Headquarters components;
- allocate resources, as directed by the Assistant Administrator;
- operate ORD fiscal and manpower controls.
- oversee ORD's information resources management activities, which includes all ADP management.

Issues

Reinforcing the ORD Infrastructure

If the EPA is to be successful in its mission of protecting public health and the environment, its regulatory decisions and control strategies must be firmly grounded in the best possible scientific and technological base. This scientific mission within the Agency is carried out by ORD through a major inhouse research and development program supported by an extensive extramural program of research contracts and various cooperative agreements with academic institutions.

The inhouse research program is conducted by ORD scientists and engineers in 12 major laboratories and 7 other field installations

throughout the nation. If the Agency is to be effectively served by ORD, it is essential that the inhouse research program be supported by an adequate infrastructure of research facilities, scientific equipment and supplies, as well as a highly trained and motivated scientific workforce.

Beginning in the mid to late 1970's, ever increasing mission demands and increasingly constrained intramural resource availability has caused the quality of the ORD infrastructure to be eroded. The majority of ORD laboratory facilities are mostly over 25 years old. Things are beginning to break down, some roofs have actually fallen in and nearly all physical plants are in need of renovation and modernization. Industry standards for the replacement of scientific equipment is 7 years. By such a standard, over 60% of ORD's scientific equipment is either obsolete or in need of upgrade at a cost which will approach \$84 million. While ORD has recently invested in a contemporary computing and telecommunications network, capacity remains a problem and with the increasing need for large environmental models it is essential that ORD acquire a "super computing" capability. With respect to the workforce, the current ORD investment in training and career development averages approximately \$240 per employee per year. When compared to as much as \$1500 per employee by many technically sophisticated industries, we do not stand in very good stead.

In response to the problem, ORPM has taken the lead in chairing a new Intramural Task Force consisting of the ORD Deputy Office Directors. During the past year, that committee fashioned a series of 1990 intramural budget initiatives which total in excess of \$56.8 million. This would include:

- | | |
|--|--------|
| • Inflationary Adjustment of intramural account | \$4.5M |
| • Human Resources (training & development) | 1M |
| • Scientific Instrumentation (New: \$5M Replacement: \$15M) | 20M |
| • Facilities and Equipment (\$1M Repair/Maintenance Under \$25K; \$1.2M Bldg.Equipment Replacement; \$8.5M Operate New Facilities) | 10.7M |

Office of Research Program Management

- Travel 1.2M
- Super Computer 19.4M

In addition to the requested dollars, the budget proposal also included increased flexibility which would enable ORD management to use different appropriations for dealing with priority infrastructure problems.

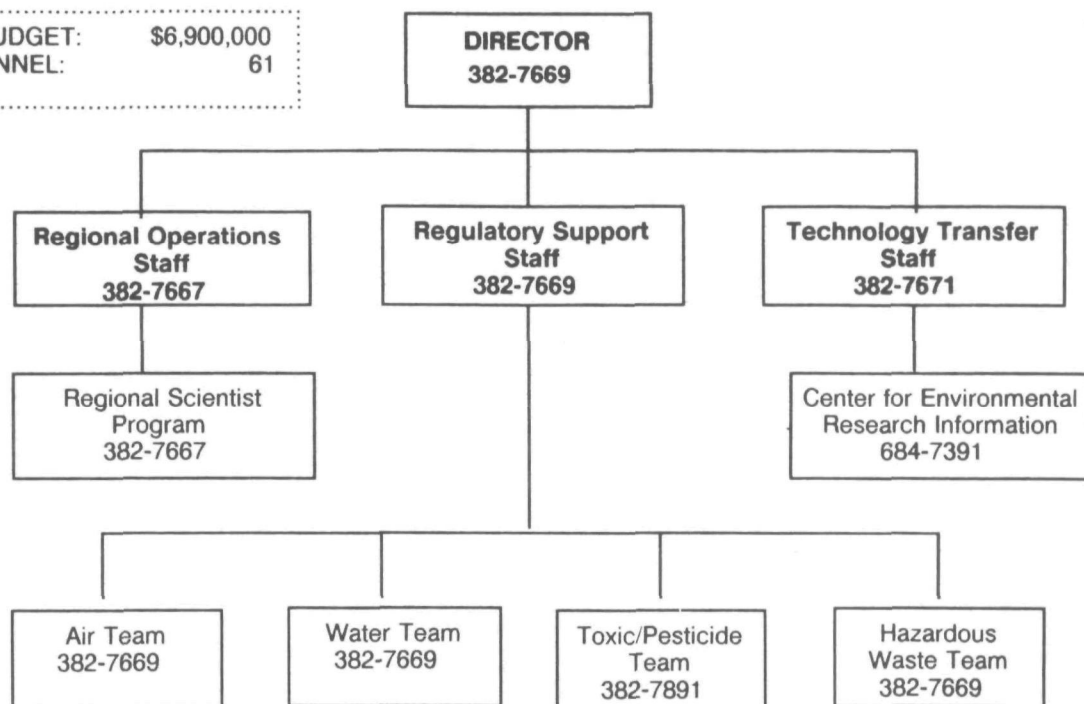
These budget initiatives for ORD were incorporated into the Agency FY 1990 budget request to OMB.

Office of Technology Transfer and Regulatory Support



Peter W. Preuss has been the Director of the Office of Technology Transfer and Regulatory Support since 1988. From 1985 to 1988, he was the Director of the Office of Health and Environmental Assessment. Dr. Preuss began his career with the Boyce-Thompson Institute for Plant Research. He received a Ph.D. and master's degrees in Plant Physiology and Biochemistry from Columbia University and a bachelor's in Chemistry and Mathematics from Brooklyn College.

FY89 BUDGET: \$6,900,000
PERSONNEL: 61



Office of Technology Transfer and Regulatory Support

Functions

The Office of Technology Transfer and Regulatory Support (OTTRS) has three main functions:

- analysis and integration of science in the development of regulations,
- technology transfer on behalf of the Office of Research and Development, and
- maintenance of a network of scientists in each of the EPA Regions to provide ORD expertise for regional programs.

OTTRS has a staff of about 70 people and a budget of about \$6 million. It integrates and disseminates ORD's scientific and engineering information and expertise into regulatory decision-making and transfers information and technology to state and local organizations involved in environmental protection. The Director advises the Assistant Administrator on regulatory support provided to Program Offices by ORD scientists and engineers, on methods for enhancing program effectiveness through technology transfer and ORD-specific implementation of the 1986 Technology Transfer Act, and on increased attention to Regional Office needs and networking of national issues. OTTRS will have the lead role for technology transfer within ORD, will provide technical and policy assistance to ORD laboratories and serve as a focal point for communication and coordination with EPA program offices, EPA regional offices, and non-EPA organizations.

Regulatory Support Staff Functions:

- analyzes, integrates and communicates policy issues and research requirements,
- makes sure ORD evaluates and contributes to basis of scientific issues, and
- coordinates ORD's involvement in issues.

Technology Transfer (TT) Staff Functions:

- channels information exchange and technology transfer of ORD risk assessment activities,
- develops and manages a TT program,
- promotes transfer of information to state and local users and ensures that ORD products deliver results from analysis and communication,
- assesses TT needs, and
- manages the Center for Environmental Research Information (CERI) to:
 - implement a comprehensive national program,
 - facilitate dissemination and exchange of scientific or technical information resulting from ORD research and development programs.

Regional Operations Staff Functions:

- assists regions with short- and long-term research,
- identifies and integrates regional research requirements,
- represents regional interests in planning and budgeting,
- rotates ORD scientists through regional offices, and
- serves as a liaison between regional offices and ORD offices and laboratories.

Program Activities

Historically, ORD's expertise has not been fully utilized in the development of Agency policy, despite the fact that a large part of the ORD program is directed at regulatory issues. The OTTRS regulatory support function ensures that scientists in all ORD offices and laboratories review the scientific and technical basis of Agency regulatory approaches. As a result, technical weaknesses are identified, cross-disciplinary issues are reviewed in an integrated fashion, and ORD positions are clearly communicated. We provide early and active analysis of legislation that may affect ORD programs and provide feedback on research needed to execute specific regulatory approaches.

ORD's efforts in technology transfer are well received by our EPA headquarters and regional clients but have not been directed at state and local governmental agencies. Many complex environmental issues facing states and municipalities, lend themselves to solutions that can be provided through an aggressive EPA technology transfer program. These issues include: Leaking Underground Storage Tanks (LUST); Municipal Waste Management and Incinerator Siting Decisions; Toxic Chemical Releases and the Community's "Right to Know;" and Indoor Air Pollution. OTTRS has formulated a new program of "Cooperative Environmental Management" that is designed to ensure that the scientific and technical information that ORD generates is shared with the broadest possible audience. This program will refocus ORD's research effort to respond to the needs of a decentralized environmental program; give ORD resources leverage by joining efforts with states and municipalities; and provide leverage for ORD resources through joint efforts with the private sector - stressing the goals of the Technology Transfer Act of 1986.

There is general agreement among ORD senior management that we need to improve communication between ORD and the EPA regional offices. Although we have been responsive to ad hoc requests for technical assistance, regional research needs have not received the priority attention that they deserve in the ORD planning process. In order to foster a more interactive relationship we have established the ORD Regional

Scientist Program. We have assigned four senior ORD scientists to work in EPA regional offices, and we plan to select six more within the year. Regional Scientists will broker technical assistance to the regions and will champion regional research needs within ORD. Cooperative agreements with the National Governors' Association; the National League of Cities; and the Association of State and Territorial Health Officials, provide us with additional insight with respect to better serving state and local clients.

Center for Environmental Research Information



Calvin O. Lawrence has served as the Director of the Center for Environmental Research Information since 1980. He was the Deputy Director of CERI for three years. Mr. Lawrence worked for ORD in Washington, D.C. from 1972 - 1977 ending his tenure there as Technical Assistant to the Assistant Administrator for ORD. He began his Federal career in 1963 as Mathematician and Electrical Engineer at the Naval Ordnance Laboratory, White Oak, Maryland. Mr. Lawrence was awarded a EPA Bronze Medal in 1973. He has a bachelor's in Mathematics from Lamar University and a master's in Numerical Science from John Hopkins University.

Functions

The Center for Environmental Research Information (CERI) is a focal point for the exchange of scientific and technical information both within the Federal government and to the public. CERI's Technology Transfer and Technical Information staffs coordinate a comprehensive technical information program in support of the activities of EPA's Office of Research and Development (ORD) and its laboratories nationwide.

The Technology Transfer Staff is responsible for working with the Program Offices and Regions to produce Technology Transfer products that aid states, local governments, and the regulated community in complying with EPA regulations. This information is based upon the latest technology and is in a form that is easily understood as well as comprehensive in coverage.

CERI's technical information components are responsible for the production and distribution of ORD scientific and technical reports, responding to requests for publications and the quality control of all ORD's information products through the application of standard procedures for the production of documents and through a review and sign-off mechanism to insure that the science has met applicable standards.

FY88 Products

Emerging Technologies for Upgrading Existing or Designing New Drinking Water Treatment Facilities

Assessment and Management of Drinking Water Contamination

Assessment and Management Workshop

National AWWA Meeting, Orlando, FL, June 20-23, 1988

Constructed Wetlands and Aquatic Plant Systems

Requirements for Hazardous Waste Landfill Design, Construction, and Closure

Model on Exposure and Bioaccumulation of Toxicants in Surface Waters

Model for Metals Equilibrium Speciation (MINTEQA1)

Transport and Fate of Contaminants in the Subsurface

Leak Detection Methods for Underground Storage Tanks

Center for Environmental Research Information

Field Evaluations of Municipal Wastewater Treatment Technologies

APCA Meeting

WPCF Meeting

Alternative Treatment Technologies for Superfund Sites

Compendium of Technologies Used in the Treatment of Hazardous Wastes

Guide to Technical Resources for the Design of Land Disposal Facilities

Community Relations in Superfund

Field Screening Methods Catalog

Superfund Exposure Assessment Manual

Guidance Document for Providing Alternative Water Supplies

Technical Approaches to Cleanup of Radiologically Contaminated Superfund Sites

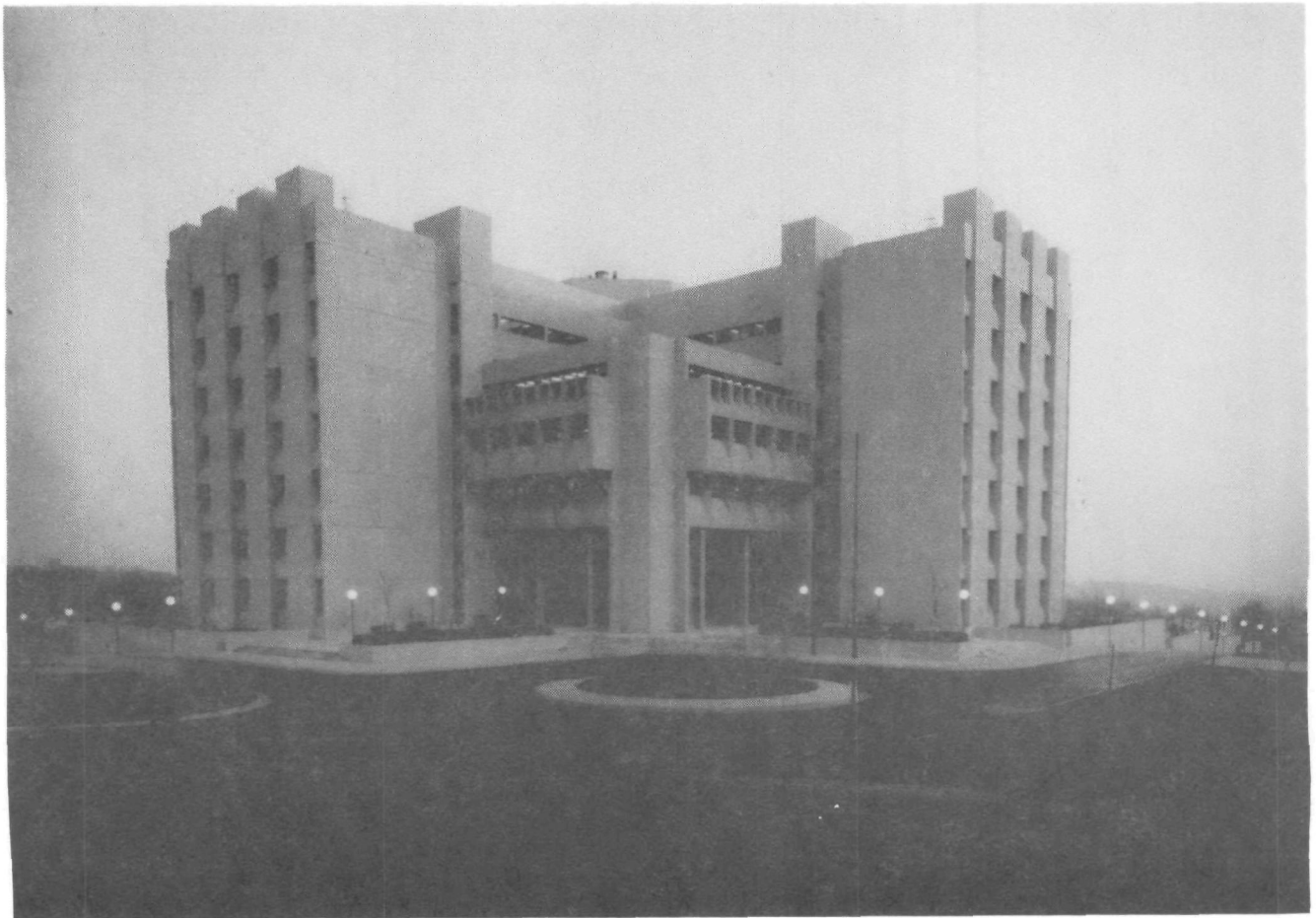
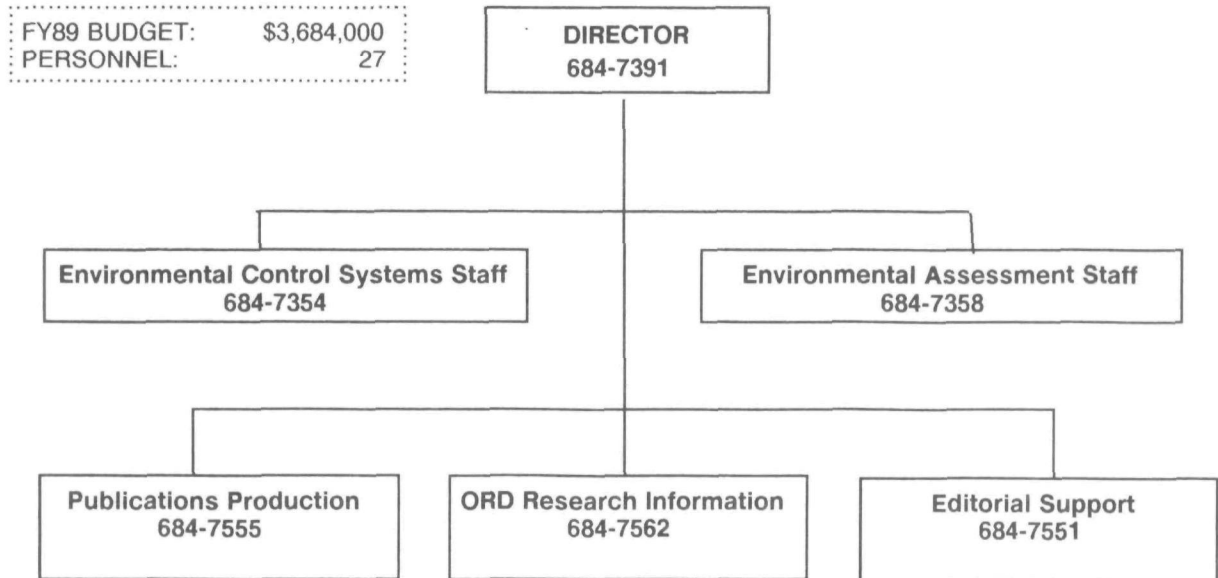
Technology Screening Guide for Treatment of CERCLA Soils and Sludges

Assessment of International Technologies for Superfund Applications

Most Important Publication

Constructed Wetlands and Aquatic Plant Systems for Municipal Wastewater Treatment

Center for Environmental Research Information

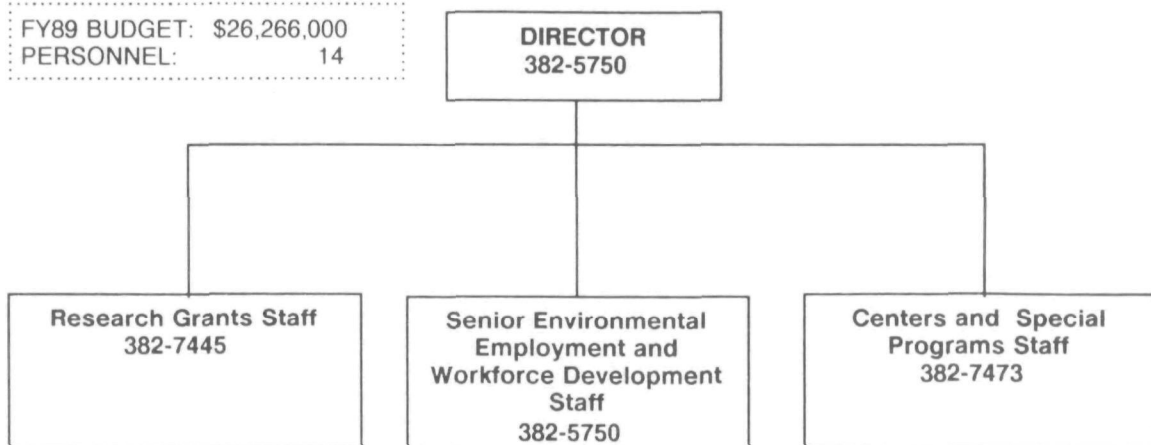


Office of Exploratory Research



Roger S. Cortesi has been the Director of the Office of Exploratory Research since 1984. From 1972 to 1984, he held supervisory positions in several Agency programs, including the Office of Health and Ecological Effects, the Environmental Research Center, and the Office of Planning and Evaluation. Dr. Cortesi began his career as an advisory engineer with Westinghouse. He received a Ph.D. in Physics from the University of Virginia and a bachelor's degree in Mathematics from Harvard University.

FY89 BUDGET: \$26,266,000
PERSONNEL: 14



Office of Exploratory Research

Functions

The Office of Exploratory Research (OER) is responsible for planning, administering, managing and evaluating EPA's exploratory research program in general and, in particular, its extramural grant research in response to Agency priorities as established by Agency planning mechanisms. It supports fundamental research aimed at developing a better basic scientific understanding of the environment and its inherent problems and entails close relations with the American environmental research community. OER's main goals are:

- to have the environmental research community aware of and working on problems of interest to EPA;
- to promote close interaction and mutual awareness between EPA researchers and the environmental research community;
- to provide general support to the research community for work on fundamental environmental research, thereby promoting a solid foundation of knowledge for the country's large applied environmental research program, a cadre of scientific and technical personnel in the environmental sciences, and an "over-the-horizon" capability for identifying problems and solutions.

OER's goals are accomplished primarily through four core programs: (a) a competitive investigator-initiated research grants program, (b) an environmental research centers program, (c) a visiting scientists program, and (d) a small business innovation research (SBIR) program.

Program Activities

- The Research Grants Program (RGP)--supports research initiated by individual investigators in areas of interest to the Agency. Research proposals are solicited via two mechanisms: (1) the general "Solicitation for Research Proposals," which is published each year and invites proposals in five broadly defined areas of environmental science and engineering; and (2) the Request for Applications (RFA) which is a more targeted solicitation mechanism that requests proposals in well-defined

areas of particular interest to the Agency such as global climate change and hazardous substances. All proposals received in response to either mechanism are subjected to external peer review.

In an effort to provide more support to minority institutions for the conduct of basic environmental research, the Research Grants Program makes available pre-application assistance for minority faculty at Historically Black Colleges and Universities (HBCUs) through its Minority Institutions Assistance Program.

- The Research Centers Program (RCP)--supports multidisciplinary research, which is conducted in a university setting and focused in areas of priority interest to EPA. Research centers are supported in the areas of: waste elimination, intermedia transport, ecosystems, marine sciences, advanced control technology, ground water, epidemiology, and hazardous waste. In FY88, the RCP initiated the establishment of five hazardous substance research centers.

- The Visiting Scientists Program--has two components: a competitive visiting scientists and engineers program and a summer fellowship program. The objective of the Visiting Scientists and Engineers Program is to attract accomplished visitors into ORD laboratories for 1 to 3 years to strengthen the Agency's research program by fostering better exchange between EPA researchers and the rest of the environmental research community. The Summer Fellows Program is carried out in cooperation with the American Association for the Advancement of Science and sponsors the assignment of post-doctoral environmental science and engineering fellows to EPA facilities for the summer months to conduct environmental research and policy projects.

- The Small Business Innovation Research Program--is mandated by Public Law 97-219 which requires EPA to devote 1.25% of its extramural research and development budget to Small Business Innovation Research (SBIR). The SBIR Program funds, via contracts, small businesses with ideas relevant to EPA's mission. The program focuses exclusively on projects in control technology or process instrumentation development.

Office of Exploratory Research

In addition to the above core programs, OER administers other programs which are also important to the accomplishment of its goals. They include:

- a Minority Fellowship Program, which awards fellowships to college seniors and graduate students enrolled on a full-time basis at Historically Black Colleges and Universities and majoring in curricula that could be applied to the solution of environmental problems.
- a Minority Summer Intern Program, which extends to recipients of fellowships under the Minority Fellowship Program the opportunity for hands-on experience in the area of their academic training by way of a summer internship at EPA or some other environmental organization.
- **the Agency's Senior Environmental Employment Program (SEE)**, which utilizes the skills and talents of older Americans to meet employment needs of environmental programs throughout EPA.
- the Federal Workforce Training Program, which coordinates ORD's participation in workforce training programs used by state and local governments.
- the Scientific and Technological Achievement Awards Program, which gives recognition and makes monetary awards to EPA/ORD laboratory scientists and researchers for outstanding contributions to environmental research.

Issues

There are two main programmatic issues (August 1988) relating to OER. They are:

- the desirability and size of the investigator-initiated competitive grants program, and
- the future of the Environmental Centers program when the current commitment is over.

(Last year of commitment is FY90 for seven of the centers and FY91 for the other.)

In the proposed FY90 budget forwarded to OMB by EPA, the need for and funding of a federal grants program in the general area of environmental science and technology is discussed. The rationale is:

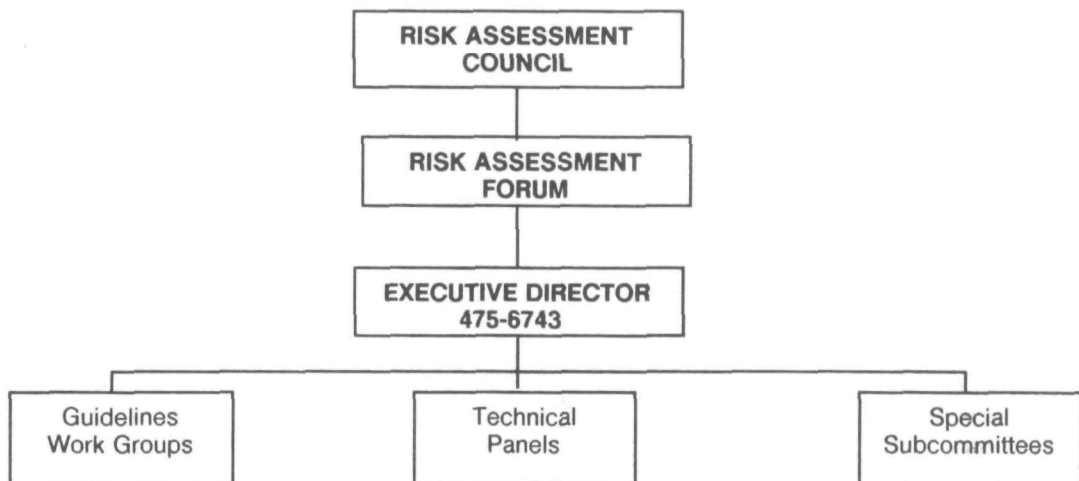
The federal government needs such a program (1) to support its large environmental applied research program, (2) to have adequate manpower for future environmental research and management needs and (3) to provide an "over-the-horizon" capability to get an early start on environmental problems and their solutions. The program should be at least \$50 million/yr. This would support 40 new starts a year in each of the five general areas of the program's research. This level was chosen as probably the lowest level that would let competent researchers "bet their careers" on reliable funding. EPA should run the program (1) because it has a good record in running a grants program and (2) because the other agencies who would be candidates have their own priorities and would not fund in a way efficiently useful to EPA's needs.

The future of the environmental research centers program does not need immediate action or decisions. Currently we are evaluating the program with the help of an outside contractor with a report due in early 1989. Included in the evaluation are: (1) what has worked in the current EPA program and why, (2) what has worked in other agencies' center programs and why, (3) political resistance to closing a center, and (4) how the center program would fit if more legislated centers (e.g., ground water) are added to the five Superfund centers.

Risk Assessment Forum



Dorothy E. Patton has been the Executive Director of the Risk Assessment Forum since 1985. From 1976-1985, she was an attorney for EPA in the Air Division and Pesticides and Toxic Substances Division. She has received two EPA Bronze Medals. Before coming to EPA, Dr. Patton held consulting positions at Columbia and Tufts Universities. She began her career as an instructor in cell biology at Albert Einstein College of Medicine. Dr. Patton received a J.D. degree from Columbia University School of Law, a Ph.D. in Developmental Biology at the University of Chicago, and a bachelor's degree in Chemistry at the University of Wisconsin.



Risk Assessment Forum

Functions

EPA's Risk Assessment Forum is responsible for scientific and science policy analysis of precedent-setting or controversial risk assessment issues of Agency-wide interest. The primary objective is to promote Agency consensus on risk assessment and to ensure that this consensus is incorporated into appropriate guidance for Agency scientists and managers. To fulfill this purpose, the Forum assembles risk assessment experts from throughout the Agency to study and report on the issues formally and from an Agency-wide scientific perspective.

Forum activities include developing scientific analyses, risk assessment guidance, and risk assessment methodology for use in ongoing and prospective Agency actions; using scientific and technical analysis to propose risk assessment positions for Agency programs; and fostering consensus on these issues. Generally, the Forum focuses on generic issues fundamental to the risk assessment process, analysis of data used in risk assessment, and on developing consensus approaches. Peer review and quality assurance of completed risk assessments or review of non-scientific risk management issues are not standard Forum functions. Risk Assessment Forum reports and actions are referred to the Risk Assessment Council for consideration of policy and procedural issues, and Forum scientific analyses become Agency policy upon recommendation by the Risk Assessment Council and concurrence by the EPA Administrator.

As the administrative arm of the Forum, the ORD's Forum Staff is responsible for coordinating and implementing the work of the Forum. Accordingly, the staff assists and contributes to scientific analyses, coordinates all activities involving the Forum and its Technical Panels, and manages all interaction between the Forum and senior EPA management, peer reviewers, and the public. At any one time, the Staff is working with a total of 40-60 participants on Technical Panels, Colloquia, and Workshops from all parts of the Agency. In addition, the Forum-sponsored Guidelines Implementation Program involves a separate

group of approximately 60 people, again from all parts of the Agency.

Issues

The issues before the Risk Assessment Forum vary as risk assessment issues become prominent or controversial within the Agency or in the larger scientific community. Issues currently before the Forum fall into three general categories:

- **Carcinogen Risk Assessment.** Recently concluded or ongoing Forum analyses on carcinogen risk assessment include:
 - the relationship between ingested inorganic arsenic and skin cancer;
 - policy guidance on the use of neoplastic nodules found in rat liver tissue;
 - guidance on the use of non-tumor end points for assessing cancer risk in follicular cells of the thyroid gland;
 - toxicity equivalency factors for dioxins other than 2,3,7,8-TCDD; and
 - general topics under study for revisions of EPA's carcinogen risk assessment guidelines (classification system weight-of-evidence scheme, policy on use of benign and malignant tumors, etc.).
- **Health Effects Other Than Cancer.** Recently completed or ongoing Forum projects relating to health effects other than cancer include:
 - risk assessment guidelines for male reproductive effects;
 - risk assessment guidelines for female reproductive effects;
 - a report on cholinesterase inhibition as an adverse toxicologic effect;
 - risk assessment guidelines for neuro-toxic effects;
 - amendments of EPA's 1986 guidelines for developmental toxicity (additional guidance on use of data on maternal toxicity and on quantification for developmental effects);

workshop report on the use of one- and two-generation reproduction studies;

developmental and reproductive toxicity studies involving dermal exposure; and

general risk assessment guidelines for health effects other than cancer.

- **Exposure Guidance.** Ongoing Risk Assessment Forum projects on exposure issues include:

exposure measurement guidelines to supplement EPA's exposure guidelines issued in 1986;

uncertainty analysis in exposure assessment;

exposure validation models; and

guidance on standard factors for use in exposure assessment.

FY88 Products

Special Report on Ingested Inorganic Arsenic: Skin Cancer; Nutritional Essentiality

Thyroid Follicular Cell Carcinogenesis: Mechanistic and Science Policy Considerations

Proposed Guidelines for Assessing Female Reproductive Risk

Proposed Guidelines for Assessing Male Reproductive Risk

Notice of the Intent to Review the 1986 Guidelines for Carcinogen Risk Assessment

Most Important Publication

Special Report on Ingested Arsenic: Skin Cancer; Nutrition Essentiality

Senior Official for Research and Development Cincinnati



Francis T. Mayo assumed the position of Senior Official for Research and Development (SORD) at the Andrew W. Breidenbach Research Center (AWBERC) in August 1988 after having served as the Director of the Water Engineering Research Laboratory since 1976. Prior to 1976, he served for five years as the U.S. EPA's Regional Administrator for Region V. Mr. Mayo began his federal career with the Federal Water Pollution Control Administration in 1966. He holds a bachelor's degree in Civil Engineering from the University of Utah and is an Adjunct Professor of Environmental Science at the University of Cincinnati. Mr. Mayo was awarded two bronze metals for Meritorious Service by the U.S. EPA in 1982 and 1986.

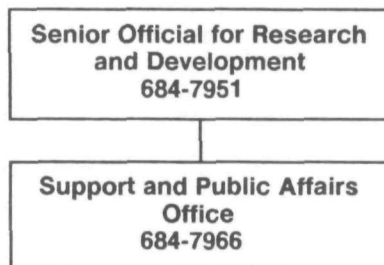
Functions

The Office of the Senior Official for Research and Development-Cincinnati is a field element of the Immediate Office of the Assistant Administrator for Research and Development (AARD). The Office functions as the official spokesperson for ORD and the Agency in Cincinnati and has the lead responsibility for coordinating with Region V and with ORD's lead region, with Headquarters, and with program offices on all appropriate matters. The Office also has the lead responsibility for the planning and coordination of outreach programs at the Andrew W. Breidenbach Environmental Research Center (AWBERC) including local Congressional affairs, public affairs and community relations, academia and training, media relations, international and

domestic visitors, intergovernmental relations, support services, and related programs.

Specifically, the Office is responsible for initiating and directing programs of:

- Federal Technology Transfer Act
- ORD Training Focal Point
- Regulatory Compliance
- Congressional Relations
- Academic Relations
- Public Affairs and Community Outreach
- Technical Assistance
- Support Services



Senior Official for Research and Development Research Triangle Park



Frank T. Princiotta assumed the duties as Senior Office of Research and Development Official at RTP in March 1988. He also serves as the Director, Air and Energy Engineering Research Laboratory at RTP. His prior work with EPA includes five years (1975-1980) in the Office of Environmental Engineering and Technology at EPA Headquarters. Prior to joining EPA, he worked with Hittman Associates (1966-1971) and at the Office of the U.S. Atomic Energy Commission (1962-1966). Mr. Princiotta holds a B.S. degree in Chemical Engineering from City College, New York and a certificate in Nuclear Engineering Graduate Studies from the Oak Ridge School of Reactor Technology, Oak Ridge, Tennessee. He has received three EPA Bronze Medals and a Gold Medal for management and technical performance and a President's Meritorious Executive Award for contributions to EPA's energy research program.

Functions

The Senior Office of Research and Development Official (SORDO) acts as the spokesperson for ORD at the Research Triangle Park. His responsibilities include coordinating with Region IV, the lead ORD region, headquarters, and program offices on matters that affect ORD/RTP. Through the Support Services Office (SSO), the SORDO provides the EPA-RTP, N.C. laboratories with a range of administrative and management services which are more appropriately centralized than secured by each laboratory individually.

SSO provides:

- Public awareness and information
- Facility and equipment use

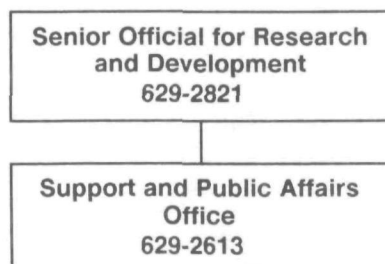
Environmental compliance and occupational health and safety program implementation

Radiation safety program management

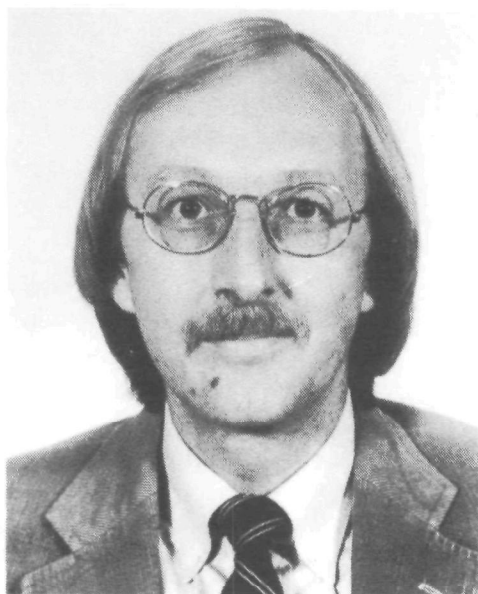
Committee responsibilities on Human Resources Mini-Council, Union-Management Committee, EEO Council, FWP, Training, Advisory and Facility Management

Handling of outside audit visits, Confidential Business Information, and health maintenance examinations

Project officer responsibilities on incineration operation, chemical storage and issue, and audiovisual services support

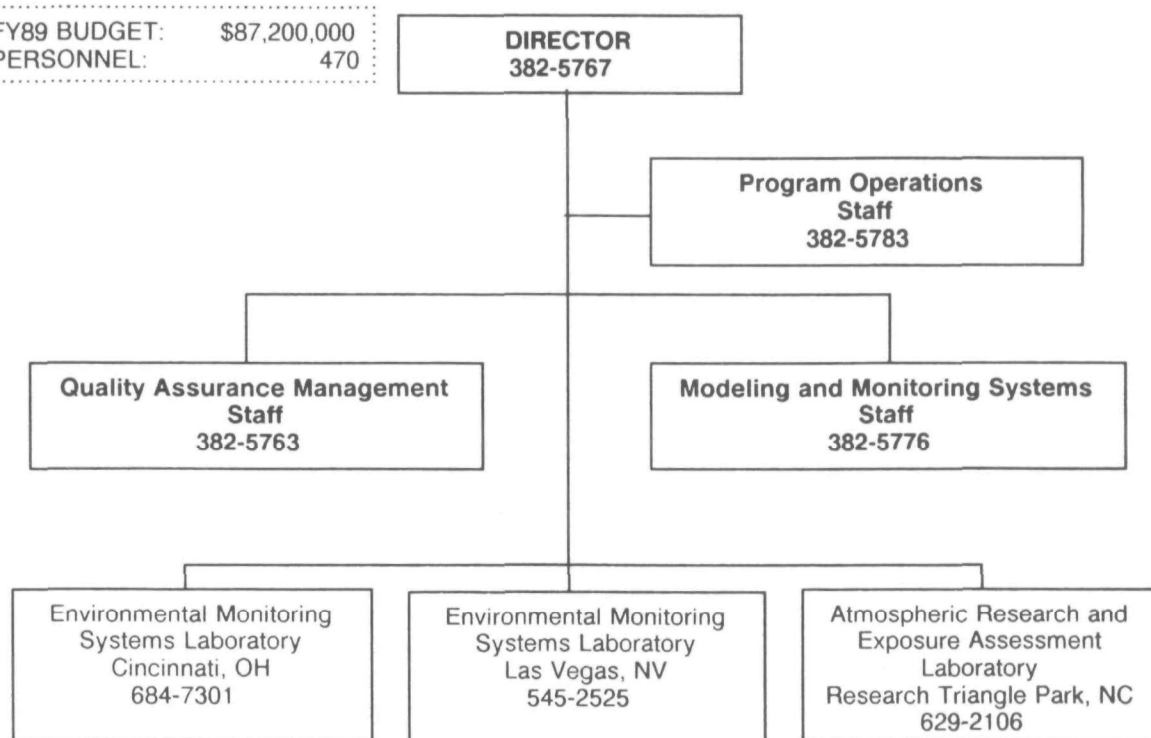


Office of Modeling, Monitoring Systems and Quality Assurance



Rick A. Linthurst is the Acting Director of the Office of Modeling, Monitoring Systems and Quality Assurance. Dr. Linthurst joined the Agency in 1985 as Director of the Acid Deposition Aquatic Effects Research Program. Before joining the Agency, he was the Director of Ecological Services for Kilkelly Environmental Associates and managed the Acid Deposition Research Program at North Carolina State University. He has received two Bronze Medals. Dr. Linthurst received his Ph.D. degree in Botany and a master's degree in Ecology at North Carolina State University and a bachelor of science degree in Biological Sciences from Lebanon Valley College in Pennsylvania.

FY89 BUDGET: \$87,200,000
PERSONNEL: 470



Office of Modeling, Monitoring Systems and Quality Assurance

Functions

The Office of Modeling, Monitoring Systems and Quality Assurance (OMMSQA) is responsible to the Assistant Administrator for Research and Development for planning, managing and evaluating a comprehensive program for:

- characterizing the sources, atmospheric transformations and pathways, and the physical, chemical, and biological properties of pollutants stressing human and ecological systems;
- determining the status and trends in pollutant concentrations and ecosystem condition;
- quantifying the exposure of humans and ecosystems to pollutants and to support exposure assessments essential to the Agency risk assessment program;
- developing and validating models to estimate the atmospheric sources, transport, fate and concentrations of pollutants for use in exposure and risk assessments and in the development of effective control strategies for risk reduction;
- developing the measurement techniques, analytical tools and quality assurance protocols necessary to characterize, monitor, and assess pollutant exposure and ecosystem condition;
- developing and supporting implementation of Agency-wide policies, procedures, and management systems aimed at assuring the quality of data procedures, produced by Agency programs. OMMSQA has a primary responsibility for generating research tools and data necessary for the Agency to predict air pollutant source to receptor relationships, and to conduct hazard and exposure assessments for developing risk management strategies for verifying their effectiveness.

In carrying out these responsibilities, the Office:

- identifies specific research, development, demonstration and service needs and priorities;
- establishes program policies and guidelines;

develops program plans including objectives and estimates of resources required to accomplish objectives;

administers the approved program and activities;

assigns program responsibility and resources to the laboratories assigned by the Assistant Administrator;

directs and supervises assigned laboratories in program administration; and

conducts reviews of program progress and takes action as necessary to assure timeliness, quality and responsiveness of outputs.

Program Activities

Air

- National Ambient Air Quality Standards - Evaluate, test, improve and standardize monitoring methodology and systems for measuring criteria pollutants in ambient and personal air including the development of quality assurance procedures. Develop a data base of information to support the development and evaluation of secondary (welfare) national ambient air quality standards especially in the areas of air pollutant effects on visibility reduction and material damage.
- New Source Performance Standards (NSPS) and State Implementation Plans (SIPs) - Develop and evaluate monitoring methodology in support of NSPS and SIPs including remote monitoring methods, compliance methods and appropriate quality assurance procedures. Develop and evaluate air quality models that can be used in assessing the effectiveness of abatement control strategies on reducing ambient air concentration of pollutants, including ozone and particulate matter.
- Hazardous Air Pollutant Regulatory Activities - Develop, evaluate and validate monitoring methodology for hazardous air pollutants (HAPs) including source, ambient, and selected urban atmospheres. Also, determine the impact of HAPs on humans by the Total Exposure Assessment Methodology (TEAM) field studies. Conduct transport and fate studies to determine the concentrations,

Office of Modeling, Monitoring Systems and Quality Assurance

transformation products and removal rate of HAPs in the atmosphere.

- **Mobile Source Pollutant Regulatory Activities** - Determine population exposure to mobile source pollutants. Validate the exposure - human activity pattern models. Characterize the tailpipe evaporative emissions of motor vehicles using both conventional gasoline fuels and alternative fuels such as methanol and ethanol. The characterization studies will be conducted to determine the effects of driving conditions and seasonal conditions (winter vs summer) on motor vehicle emissions.
- **Indoor Air Quality Research** - Investigate sources, exposures, health effects and mitigation of pollutants in indoor air environments with other Federal agencies through the Committee on Indoor Air Quality (CIAQ).
- **Stratospheric Ozone** - Air modeling analysis will be conducted to predict the influence of increasing ultraviolet-B (UV-B) radiation on ambient ozone formation in attainment and non-attainment urban areas. Controlled chamber and field studies will be conducted to determine UV-B effects on selected materials. This work is an integral component of ORD's stratospheric ozone program.
- **Global Warming** - Develop, evaluate and improve measurement statistical methods and air quality models to detect and predict the impact of the emissions of trace gases on regional climate and the resulting impact on regional ambient air quality levels. This work is an integral component of ORD's global climate program.

Water Quality

- **Water Quality Based Approach** - Permitting. Provide assurance that ambient water quality monitoring data for regulation setting, enforcement, or compliance purposes are scientifically valid and legally defensible. Conduct interlaboratory validation studies to obtain precision and accuracy data for each monitoring method. Promulgate "Analytical Methods for the Analysis of Pollutants" as required by Section 304(h) of the Clean Water Act.

- **Waste Water Treatment Technology** - Provide quality control materials and calibration standards for regulated CWA analytes. Conduct performance evaluation studies of EPA, EPA Contractor/Grantee, state and local laboratories. Evaluate and revise data quality criteria and develop reference materials as needed.

Drinking Water

- **Drinking Water Technology** - Provide analytical procedures for use by the Agency, States, municipalities, and system operations to monitor contaminants to assure compliance with maximum contaminant levels pursuant to Section 1401 of the Safe Drinking Water Act and provide quality assurance/quality control programs for on-site evaluation and certification of drinking water monitoring laboratories. Provide support to laboratories and offices involved with data collection in support of regulations and standards. Provide for methods development and analytical procedures to produce precise and accurate total measurement systems for chemical, radiochemical, and microbiological analysis. Develop and distribute QC and PE samples for drinking water laboratory certification program.
- **Groundwater** - Develop accurate and reliable total measurement systems by providing standardized methods, laboratory evaluations, performance evaluation and quality control samples, sample testing, and verification. Develop methods for locating abandoned wells, geophysical methods to detect and evaluate underground movement of fluids from injection wells, provide quality control procedures and guidelines to support Agencywide QA program, and develop methods for well head protection.

Hazardous Waste

- **Waste Identification** - Provide for evaluation and modification of analytical techniques for hazardous waste characterization so they are scientifically accurate and legally defensible. Develop and evaluate subsurface monitoring methods, including statistical sampling designs, summary methodologies and

Office of Modeling, Monitoring Systems and Quality Assurance

monitoring strategies for use at RCRA waste sites.

- **Quality Assurance** - Provide support to assure the quality of the RCRA data generated by the USEPA regions, contractors and state and local agencies.
- **Releases** - Provide aerial photography, satellite imagery, and multispectral scanner support to assist Regional Offices in Spill Prevention, Control and Counter-measure (SPCC) surveys, planning, and emergency response activities. Develop protocols for external monitoring around underground storage tanks (UST). Evaluate procedures for site characterization both to determine active leaks and the boundaries for corrective action. Provide methods to monitor UST cleanup progress.

Pesticides

- **Health: Markers, Dosimetry, and Extrapolation** - Systematically evaluate the potential for use of biomarkers in exposure monitoring from an evaluation of the literature and pilot studies of pesticide exposure.
- **Exposure Monitoring** - Application of Total Exposure Assessment Methodology to investigate human exposure to household pesticide usage.
- **Support** - Operation of the pesticides and industrial chemical repository

Radiation

- **Manage Off-Site Radiation Monitoring Program** for DOE including hydrologic and human surveillance monitoring. Maintain quality assurance support program for measurement of ionizing radiation contaminants in air, water, milk and food.

Interdisciplinary

- **Manage the Agency-wide mandatory Quality Assurance Program** - Provide central management and oversight of the Agency's quality assurance program for environmental data operations. Key program elements include: development of QA Program Plans covering all Agency organizations with

environmental data operations; conduct of Management Systems Reviews of selected program; implementation of the Data Quality Objectives process; and management of an Agency-wide QA training program.

Toxics

- **Analytical Methods Development for Toxic Substances** - Develop immunoassays for measurement of organic compounds in biological and environmental samples and investigate new separation procedures for analysis including chemometric approaches.
- **Health: Markers, Dosimetry, and Extrapolation** - Evaluate DNA and protein adducts for use in human exposure monitoring studies.
- **Exposure Monitoring Systems Development** - Using available data and results from specific microenvironment studies, develop predictive models for human exposure and conduct microenvironment studies to categorize human activity patterns.
- **Biotechnology/Microbial and Biochemical Pesticides Control Agents** - Develop guidelines and processes for monitoring the release of genetically engineered microorganisms (GEMS) in the environment. Conduct laboratory studies for determination of half-life in bacterial aerosols.
- **Support** - Provide quality assurance and reference standards and develop guidelines to govern routine exposure and environmental monitoring for toxic chemicals.

Multi-Media Energy

- **Develop and apply the Eulerian Regional Acid Deposition Model (RADM)** as an assessment tool.
- **Provide quality assurance for wet/dry deposition measurements and methods development for monitoring and assist in the establishment of wet/dry deposition monitoring network.**
- **National Surface Water Survey** - assist in determining the normal, seasonal variability in surface water chemistry.

Office of Modeling, Monitoring Systems and Quality Assurance

- Provide long-term monitoring support to detect changes in surface water through development of aquatic methods.
- Evaluate atmospheric exposure in the Forest Effects Research Program.
- Operate field test sites for monitoring air quality to understand and quantify effects on materials and cultural resources. Determine the effects of acid deposition on metals and painted surfaces.

Superfund

- Provide techniques and procedures for site and situation assessments. Provide monitoring techniques and procedures for site assessment; geophysical methods; remote sensing; soil sampling methods and survey designs.
- Assist in site-specific, monitoring and characterization in support of Superfund investigations.
- Develop and evaluate monitoring techniques and systems which are rapid and inexpensive, integrate monitoring systems into multi-media site assessments.
- Provide quality assurance/quality control support for the Superfund Contract Laboratory Program; to provide identification, assessment, and improvement of methods for evaluation of Superfund sites; and provide an independent QA laboratory to support monitoring activities.
- Evaluate, validate, and demonstrate newly developed techniques and systems for characterization and assessment of contamination at Superfund sites.

Issues

Expanding Environmental Characterization Research

Environmental characterization is essential to determining what pollutants are released into the environment, their transport, transformation products, and fate. This information is the foundation of hazard identification and consequently the risk assessment process. Unfortunately, the increasing pressure to investigate pollutants of visible importance has eroded efforts to identify potentially damaging

pollutants as is needed to guide monitoring, assessment, and dose-response research.

OMMSQA is responsible for developing methods and quality assurance programs for environmental characterization. While having some of the best environmental chemists in this country, OMMSQA has maintained only a modest program in this research area that includes source characterization, atmospheric transport, transformation, and pollutant fate modeling, media characterization, and methods development. To remain on the cutting edge of remote characterization techniques and analytical chemistry will require increased attention to characterization studies and, as importantly, state-of-science analytical instrumentation.

OMMSQA has recently chosen to make environmental characterization one of three primary areas for research emphasis. This will require a revitalization of the methods development programs, and they will be focused on supporting our efforts in environmental trends monitoring. The long-term goal of this research is to ensure that in-house capabilities are maintained to continue meeting the methods development needs of the Program Offices and Regions.

Environmental Status and Trends Detection

Reports of ecosystem degradation are appearing with increasing frequency and suggest that cumulative, chronic, insult from multiple pollutants is likely to be the cause. Addressing emerging problems on a case-by-case basis with the resources available is an ineffective means of getting ahead of the problems, bounding them and knowing precisely where research should be conducted. A fundamental limitation of the Agency's approach to dealing with emerging problems is the absence of a regional scale, integrated environmental monitoring program that generates the data essential to improve our ability to address large scale, complex environmental issues, verify the effectiveness of control programs, or quantify, with known certainty, changes in ecosystem condition and pollutant exposures.

Designing and implementing such a program will require interagency cooperation, new approaches to statistical designs for ecological monitoring, development of indicators of ecological condition and, most importantly, a long-term commitment to the effort. OMMSQA and OEPR

Office of Modeling, Monitoring Systems and Quality Assurance

have jointly been leading the Agency in developing a program (the Environmental Monitoring and Assessment Program: EMAP) to define the current status and trends in the environment. Capitalizing on the success of the Acid Deposition Research Program, both in terms of advancements in monitoring design and interagency cooperation, ORD is changing the way scientists are thinking about the approach and chances for success of such a program. Recent support from the Science Advisory Board, the USDA Forest Service, NOAA, USGS, and CEQ continues to improve the potential for implementing EMAP and moves the Agency closer to making this essential element of our research a reality that will serve all Offices of EPA.

assessments and, consequently, risk management strategies developed for the Agency.

The Program will require substantial in-house and extramural funds for implementation and the Administrator and the AA for ORD will need to continue visible support within the scientific community and with other agencies to ensure the success of this program.

Total Human Exposure

The Science Advisory Board identified human exposure as one of the 10 areas of research that needs to be expanded. Since a knowledge of human exposure to pollutants through multiple pathways is critical to assess risk, this program is designed to generate the data required both to measure human exposure and to develop exposure models. The program includes the development of exposure measurement methods, human exposure monitoring, microenvironmental studies, development and validation of human exposure models, identification of sensitive and selective exposure biomarkers and preparation of exposure assessment documents. OMMSQA's environmental characterization, fate and transport modeling also supports human exposure studies.

OMMSQA is currently developing a strategic research plan that over time will significantly advance this area of research within the core expertise of the OMMSQA laboratories. Major exposure studies in several cities within the U.S. demonstrate the applicability of the approaches being used. OMMSQA will now begin to work toward regional and national scale efforts to better quantify exposure. It is expected that the scientific advancements being made and those expected over the next few years will be a key to improved risk

Atmospheric Research and Exposure Assessment Laboratory



Gary J. Foley is the Acting Director of the newly formed Atmospheric Research and Exposure Assessment Laboratory at Research Triangle Park, NC. He has served as Staff Director for ORD's Acid Deposition Research Program and Acting Division Director, Energy and Air, for ORD's Office of Environmental Processes and Effects Research. Dr. Foley began his career with EPA in 1973 as a Senior Chemical Engineer. Before joining the Agency, Dr. Foley served as a Project Manager for the American Oil Company. He received his Ph.D. in Chemical Engineering from the University of Wisconsin, Madison. Dr. Foley has been awarded 3 Bronze Medals by EPA.

Functions

The Atmospheric Research and Exposure Assessment Laboratory (AREAL), Research Triangle Park, North Carolina conducts intramural and extramural research programs, through laboratory and field research, in the chemical, physical, and biological sciences designed to:

- characterize and quantify present and future ambient air pollutant levels and resultant exposures to humans and ecosystems on local, regional, and global scale;
- develop and validate models to predict changes in air pollution levels and air pollutant exposures and determine the relationships among the factors affected by predicted and observed change;
- determine source-to-receptor relationships relating to ambient air quality and air pollutant exposures, developing predictive models to be used for assessments of regulatory alternatives derived from these relationships, directly or indirectly;
- provide support to Program and Regional Offices and to state and local groups, in the form of technical advice, methods research and development, quality assurance, field monitoring, instrument development, and modeling for quantitative risk assessment and regulatory purposes;

- develop and carry out long-term research in the areas of atmospheric methods, quality assurance, biomarkers, spatial statistics, exposure assessment, and modeling research to solve cutting edge scientific issues relating to EPA's mission;
- collect, organize, manage, and distribute research data on air quality, human and ecosystem exposures and trends for Program and Regional Offices, ORD, the scientific community, and the public at large.

The Laboratory is composed of the following major components: Office of the Director, Program Design and Integration Staff, Program Operations Staff, Chemical Processes and Characterization Division, Methods Research and Development Division, Exposure Assessment Division, Quality Assurance Division and the Atmospheric Sciences Modeling Division.

FY88 Products

"Phase Distribution and Artifact Formation in Ambient Air Sampling for Polynuclear Aromatic Hydrocarbons," *Atmospheric Environment*

Evaluation of Sampling and Analytical Methods for Nicotine and Polynuclear Aromatic Hydrocarbons in Indoor Air

Atmospheric Research and Exposure Assessment Laboratory

Supercritical Fluid Extraction - Gas Chromatography of Volatile Organic Compounds (VOCs) from Tenax Devices

QA Support for the National Atmospheric Deposition Program and National Trends Network Monitoring Activities from 1984 - 1987

"An Evaluation of the Semi-VOST Method for Determining Emissions from Hazardous Waste Incinerators," JAPCA

"Measurement of Atmospheric Concentrations of Common Household Pesticides: A Pilot Study," Environmental Monitoring and Assessment

"Mutagenic Atmospheric Aerosol Sources Apportioned by Receptor Modeling"

"Field Comparison of Nitric Acid Measurement Methods During the 1986 California Carbon Study"

"ASRL-RTP-J-1034 Rate Constant for the Reaction of NO₂ with Sulfur (IV) over the PH Range 5.3-13"

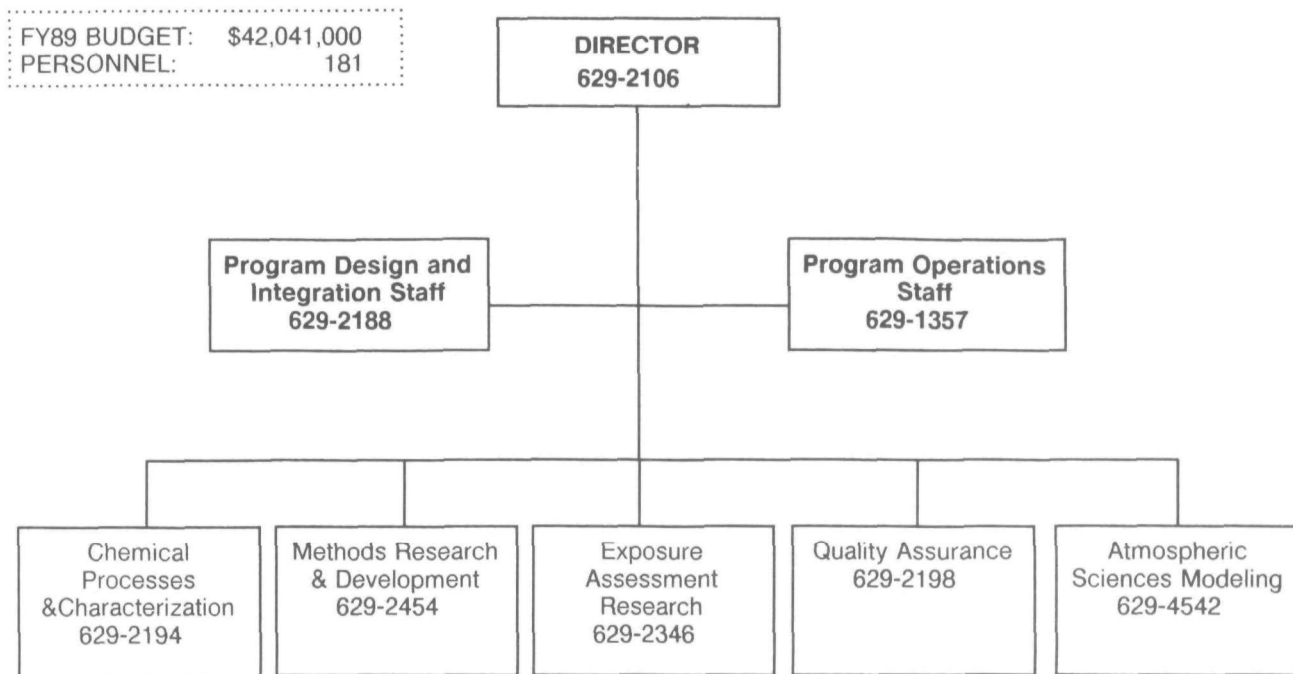
User's Guide to the Complex Terrain Dispersion Model Volume 1. Model Description and User Instructions

"Development and Evaluation of the Regional Oxidant Model for the Northeastern United States" Improved Parameterization for Surface Resistance to Gaseous Dry Deposition in Regional Scale Numerical Models

Most Important Publication

Proceedings of the 1988 Symposium on Measurement of Toxic and Related Air Pollutants

Atmospheric Research and Exposure Assessment Laboratory



Environmental Monitoring Systems Laboratory - Cincinnati



Thomas A. Clark is the Director of the Environmental Monitoring Systems Laboratory. He previously served as its Deputy Director since 1985. From 1973 - 1981, Mr. Clark worked in the Quality Assurance Division of EMSL-RTP in various supervisory positions and also served as Deputy Director of that Laboratory from 1981 - 1985 before moving to Cincinnati. He was awarded a Bronze Medal in 1986. Mr. Clark began his career as an Analytical Chemist at the Matheson Company in Norwood, Ohio. He has a bachelor's in Chemistry from Xavier University.

Functions

The Environmental Monitoring Systems Laboratory - Cincinnati (EMSL-Cincinnati) has as its primary mission to conduct research in development, evaluation, and standardization of chemical and biological methods for environmental assessments; to conduct research for detecting, identifying, and quantifying microbial pathogens found in environmental media; and to operate the U.S. Environmental Protection Agency (USEPA) Quality Assurance (QA) Program for maintaining the scientific credibility of the Agency's water, wastewater, and solid wastes/Superfund/ toxics data bases.

Developed and standardized methods are used to identify inorganic and organic pollutants and to detect and identify bacteria, viruses, parasites, and aquatic organisms in the environment. Analytical methods for effluent compliance monitoring [304(h)] are improved, modified and updated on a regular basis. These methods include procedures for inorganic, organic and biological pollutants.

Research is conducted on biotechnological methods for determining the occurrence, distribution, transport, and fate of human pathogenic parasites in the environment. Methods are developed and evaluated for the detection, enumeration, and identification of indicator and pathogenic bacteria in environmental media.

Methods for sample handling, transport, and preservation are also developed. Field methods and advanced state-of-the-art approaches are developed to be applicable to drinking water, ambient water, raw and treated wastewaters, sediments, sludges, and biological samples.

The QA program involves method confirmation and validation studies to establish the precision and bias of USEPA's selected analytical methods, QA manuals and guidelines, quality control (QC) samples, and calibration standards for all analytes regulated under water and waste programs. Performance evaluation studies and laboratory certification activities are conducted to evaluate and report on the competency of analysts and laboratories. A QA monitoring program is maintained for both biology and chemistry, which evaluates the adequacy of promulgated analytical methods and procedures.

FY88 Products

Draft Methods for Synthetic Organic Chemicals in Drinking Water:

- "Method 505 - Analysis of Organohalide Pesticides and Aroclors in Water by Microextraction and Gas Chromatography"
- "Method 507 - Nitrogen- and Phosphorus-Containing Pesticides in Water by Gas

Environmental Monitoring Systems Laboratory - Cincinnati

Chromatography with a Nitrogen-Phosphorus Detector"

- "Method 508 – Determination of Chlorinated Pesticides in Water by Gas Chromatography with an Electron Capture Detector"
- "Method 515.1 – Determination of Chlorinated Acids in Water by Gas Chromatography with an Electron Capture Detector"
- "Method 525 – Determination of Organic Compounds in Drinking Water by Liquid-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry"
- "Method 531.1 – Measurement of N-Methylcarbamoyloximes and N-Methylcarbamates in Water by Direct Aqueous Injection HPLC with Post-Column Derivatization"

"Determination of Non-Volatile Toxic Organics in Aqueous Environmental Samples Using Liquid Chromatography/Mass Spectrometry," *Analytical Chemistry*.

"Report on the Determination of Lead in Solders and Drinking Water," Response to Office of Drinking Water Request.

"Determination of Mercury (II) and Organomercury Compounds by Reversed-Phase Liquid Chromatography with Reductive Electrochemical Detection," *Analyst*.

Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms (304(h) Test Method)

"Toxicity Reduction at Municipal Wastewater Treatment Plants," *J. Water Poll. Contr. Fed.*

Revision of two chapters in the "USEPA Manual of Methods for Virology,"

- Chapter 11 (Revised March 1988). Virus plaque confirmation procedure.
- Chapter 10 (Revised December 1987). Cell culture procedures for assaying plaque-forming viruses.

"Assessment of Recovery Efficiency of Beef Extract Reagents for Concentrating Viruses from Municipal Wastewater Sludge Solids by the Organic Flocculation Procedure," *Appl. Environ. Microbiol.*

"Statistical Comparison and the Precision of the Membrane Filter and Most Probable Number Total Coliform Methods and the Heterotrophic Plate Count Used for Water Analyses." Submitted to the Office of Water.

"Precision and Relative Accuracy of the Membrane Filter and Most Probable Number Total Coliform Methods with Several Water Types," Submitted to the Office of Water.

Annual Report to the Office of Water and Enforcement Permits on the Discharge Monitoring Report-Quality Assurance Performance Evaluation Study 7

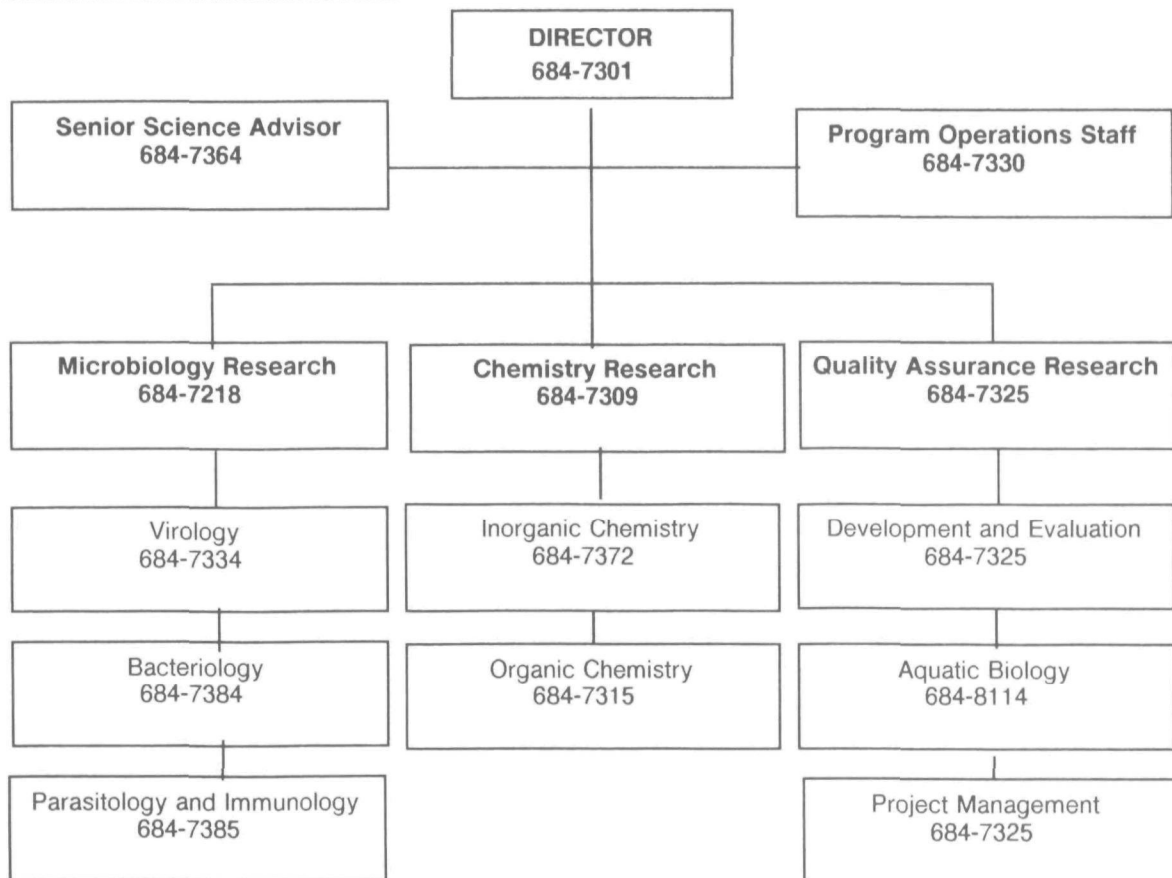
Individual and Summary Reports to about 1400 local, state, and regional laboratories in Water Pollution Performance Evaluation Studies 19 and 20.

Most Important Publication

"Final National Pesticide Survey Methods"

Environmental Monitoring Systems Laboratory- Cincinnati

FY89 BUDGET: \$9,994,000
PERSONNEL: 98



Environmental Monitoring Systems Laboratory - Las Vegas



Robert N. Snelling is Acting Director of the Environmental Monitoring Systems Laboratory, Las Vegas, NV, where he had previously served as Deputy Director since 1985. From 1970-1985, Mr. Snelling held various technical and managerial positions within EPA. A career Public Health Service Officer commissioned in 1963, Mr. Snelling began his professional activities as an instructor in Environmental Radiological Health at the Taft Engineering Center in Cincinnati. He received a master's degree in sanitary engineering from the University of Cincinnati and a bachelor's degree in civil engineering from Tufts University.

Functions

The Environmental Monitoring Systems Laboratory-Las Vegas develops methods, systems and strategies for monitoring the environment with the primary purposes of assessing the exposure of man and other receptors in the environment to polluting substances, characterizing the status of environmental quality, and identifying the trends in environmental quality.

The Laboratory develops and applies field monitoring techniques, analytical methods, and remote sensing systems for monitoring environmental pollutants. It field tests, demonstrates and applies these systems, and initiates transfers of operational systems to Agency user organizations. It provides technical support to Agency, Regional and Program Offices in response to their requests for pollutant monitoring, testing and surveillance assistance.

The Laboratory develops and operates quality assurance programs for radiation, hazardous wastes, and toxic/pesticide monitoring. This includes the development and maintenance of reference standards, preparation of performance evaluation materials, and the conduct of performance audits for EPA as well as other Federal, state, and local laboratories.

Under a Memorandum of Understanding with the Department of Energy, the Laboratory collects radiological surveillance data and performs pathways research to determine the actual and potential radiation exposure to man and his environment from past and present testing of nuclear devices.

FY88 Products

Application of Remote Sensing Techniques for Estimating Spatial Variability of Dry Deposition of Acidic Pollutants

"Bromo- and Bromochloro-polynuclear Aromatic Hydrocarbons, Dioxins and Dibenzofurans in Municipal Incinerator Fly Ash," Biomedical and Environmental Mass Spectrometry

Characterization of Household Hazardous Waste from Marin County, California, and New Orleans, Louisiana

"Estimation of Pollutant Transport and Concentration Distributions Over Complex Terrain of Southern California Using Airborne Lidar," Journal of the Air Pollution Control Association

Evaluation of Existing Total Human Exposure Models

Environmental Monitoring Systems Laboratory - Las Vegas

*Field Comparison of Ground-Water Sampling
Methods-Interim Report*

Geophysics Advisor Expert System

"Immunoassay Techniques for Pesticide Analysis"

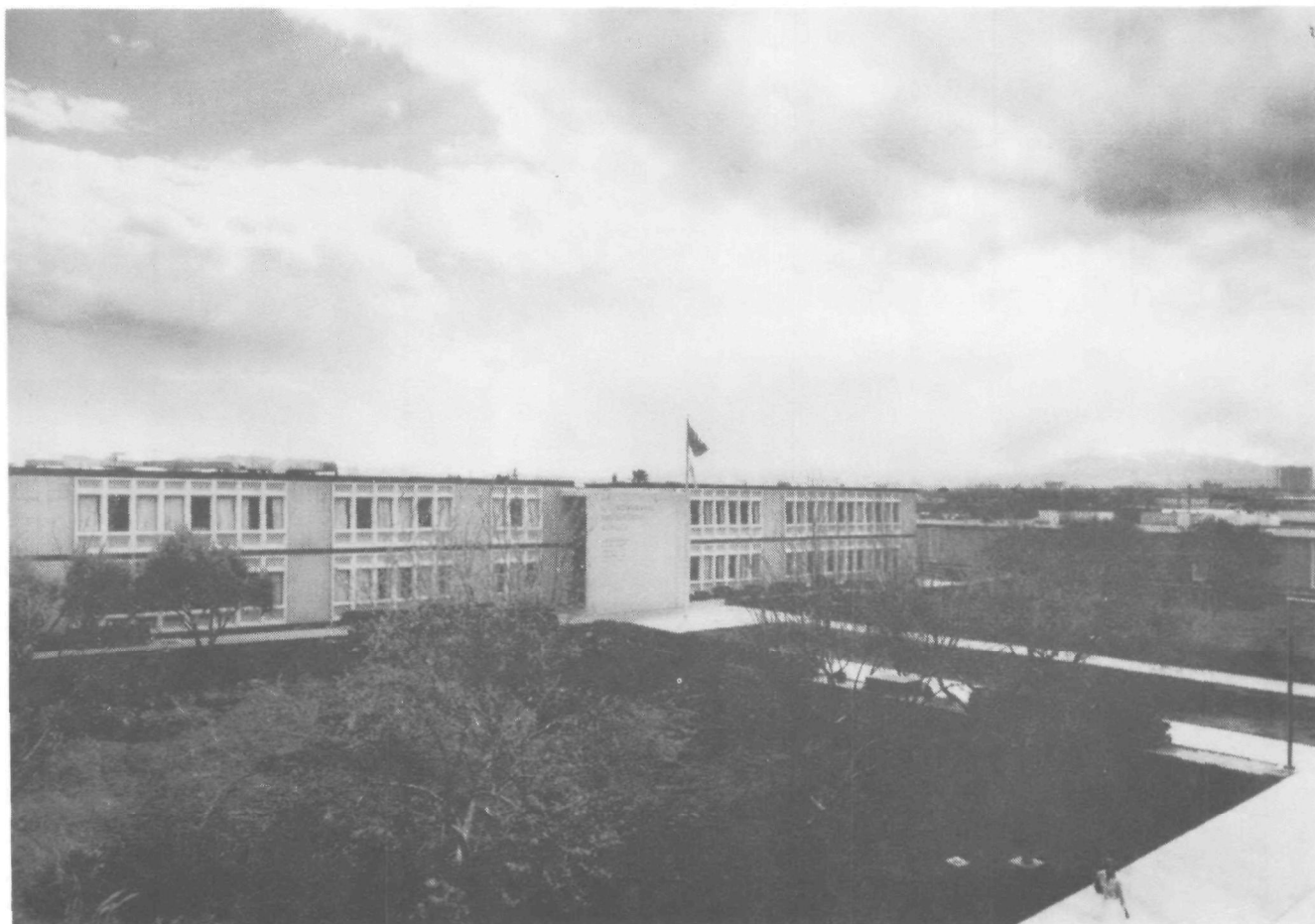
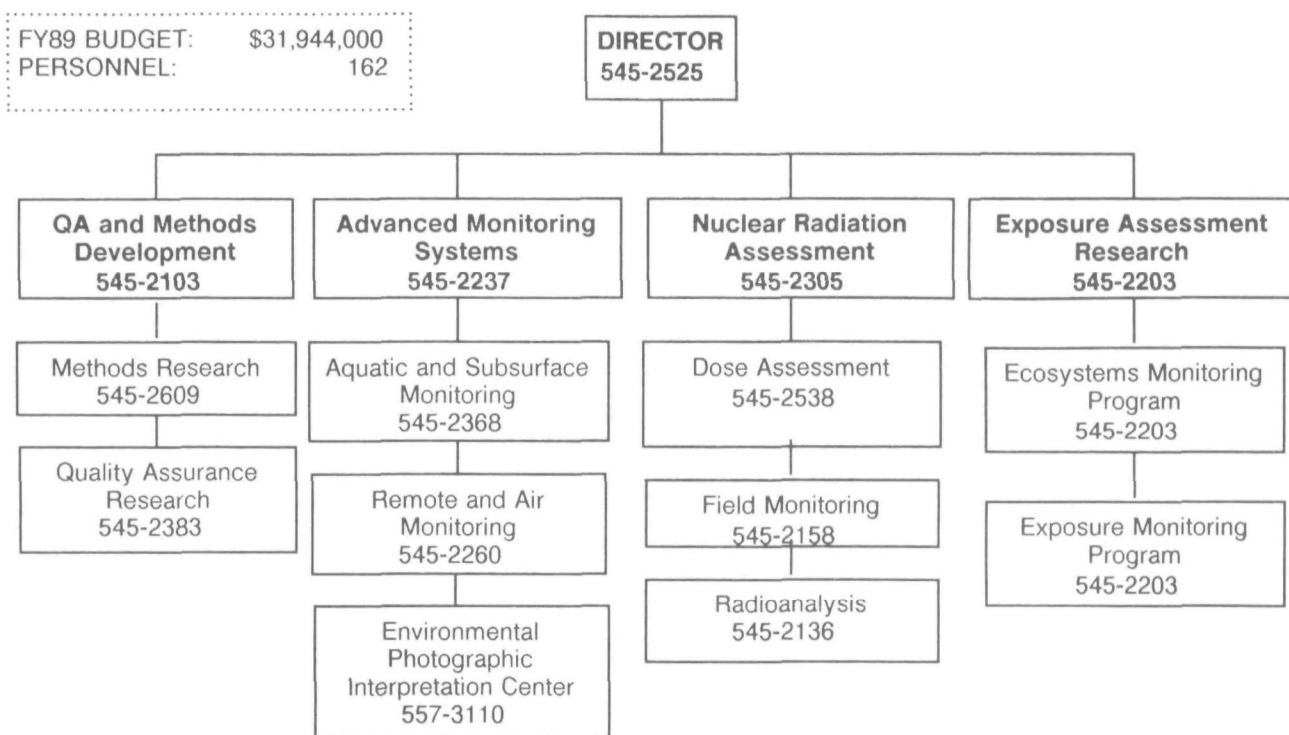
"Inductively Coupled Plasma Mass Spectrometric
Determination of Lead Isotopes," *Analytical
Chemistry*

"Ion Abundance Criteria for Gas Chromatographic/
Mass Spectrometric Environmental Analysis," *J.
Association of Analytical Chemistry*

Most Important Publication

"Estimation of Pollutant Transport and
Concentration Distributions over Complex Terrain
of Southern California Using Airborne Lidar,"
Journal of the Air Pollution Control Association

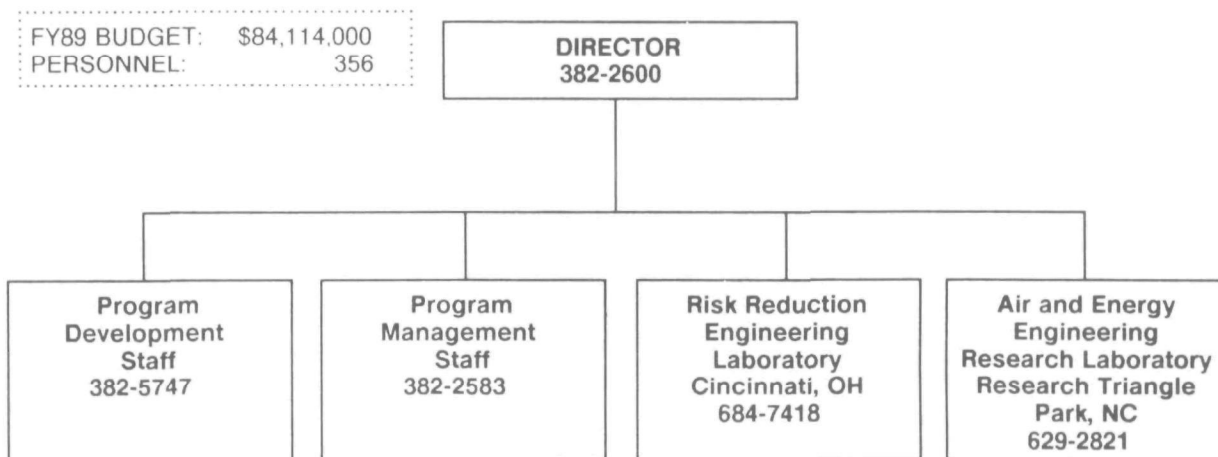
Environmental Monitoring Systems Laboratory - Las Vegas



Office of Environmental Engineering and Technology Demonstration



John H. Skinner is the Director of the Office of Environmental Engineering and Technology Demonstration. He has been the Director of several Agency programs, including the Office of Solid Waste, the State Programs and Resource Recovery Division, and the Land Disposal Division. Before joining the Agency in 1972, Dr. Skinner managed the Energy and Environmental Programs for the General Electric Research and Development Center. He received a Ph.D. and master's degree in Aeronautical Engineering from Rensselaer Polytechnic Institute and a bachelor's degree in Engineering from Hofstra University. He has received the EPA Gold Medal and Presidential Meritorious Executive Award.



Office of Environmental Engineering and Technology Demonstration

Functions

The Office of Environmental Engineering and Technology Demonstration (OEETD) is responsible to the Assistant Administrator for planning, managing, and evaluating a comprehensive program of research, development, and demonstration of cost effective methods and technologies to:

- Control and manage hazardous waste generation, storage, treatment and disposal;
- Provide innovative technologies for response actions under Superfund and technologies for control of emergency spills of oils and hazardous waste;
- Control environmental impacts of public sector activities including publicly-owned waste water and solid waste facilities;
- Improve drinking water supply and system operations, including improved understanding of water supply technology and water supply criteria;
- Characterize, reduce, and mitigate indoor air pollutants including asbestos and radon; and
- Characterize, reduce, and mitigate acid rain precursors and other pollutants from stationary sources.

OEETD is also responsible for the development of engineering data needed by the Agency in reviewing premanufacturing notices relative to assessing potential release and exposure to chemicals, treatability by waste treatment systems, containment and control of genetically engineered organisms and the development of alternatives to mitigate the likelihood of release and exposure to existing chemicals.

In carrying out these responsibilities, the Office:

- Develops program plans and manages the resources assigned to it;
- Implements the approved programs and activities;
- Assigns objectives and resources to the OEETD laboratories;
- Conducts appropriate reviews to assure the quality, timeliness, and responsiveness of outputs; and

- Conducts analyses of the relative environmental and socioeconomic impacts of engineering methods and control technologies and strategies.

The Office of Environmental Engineering and Technology Demonstration is the focal point within the Office of Research and Development for providing liaison with the Department of Energy on issues associated with clean coal and energy development. It is also the focal point within the Office of Research and Development for liaison with the rest of the Agency on issues relating to engineering research and development and the control of pollution discharges.

Program Activities

Air

- SO_x and NO_x control technologies (LIMB, ADVACATE, REBURNING)
- Hazardous air pollutant control technologies
- Indoor air source characterization and control technologies
- Ozone attainment – control of VOC emissions from products
- SARA Title III – Release prevention techniques
- Global Climate – Stratospheric Modification

Water Quality

- Municipal sewage innovative and alternative wastewater and sludge technologies
- Toxicity treatability protocols for wastewater treatment processes
- Storm and combined sewer overflow control technologies

Drinking Water

- VOCs, pesticides, and radionuclides treatment technologies
- Disinfection technologies, including evaluation of by-products
- Water quality problems in distribution systems, e.g. lead solder

Office of Environmental Engineering and Technology Demonstration

Hazardous Wastes/Superfund

- Pretreatment technologies for land disposal
- Waste minimization technologies and clearinghouse
- Land disposal technology, including air emissions
- Incineration of hazardous wastes and municipal solid wastes
- Cleanup technologies for leaking underground storage tanks
- Superfund Innovative Technology Evaluations program (SITE)
- Develop cleanup technologies for Superfund sites
- Operate Superfund Test & Evaluation facility
- Municipal solid waste and sludge innovative technology evaluations (MITE)

Pesticides

- Indemnified pesticide disposal technologies
- Protective clothing for pesticide applications

Radiation

- Radon mitigation technologies for schools
- Radon innovative technology evaluations (RITE)

Toxic Substances

- Treatability of toxic substances for premanufacturing notices
- Asbestos abatement technologies for schools and tall buildings
- Release prevention technologies for biotechnology products

Issues

Municipal Solid Waste Research Redirection

The Nation's mounting problem of how to manage municipal solid waste (MSW) requires reevaluation of MSW practices and identification of new, innovative technologies for management of waste material. A major

challenge over the next six months will involve determining how to effectively incorporate these needs in reauthorization legislation for RCRA. It is clear, however, that the law must encourage the evaluation of alternative MSW practices relating to source reduction and recycling which can reduce the amount of residuals for disposal, and to conserve raw materials and land disposal capacity. New technologies for waste management associated with combustion and composting also need to be investigated. Technical information and guidance for use by municipal officials, designers, engineers, and owners and operators responsible for solid waste management needs to be developed.

To accomplish these goals, EPA has proposed the Municipal Waste Innovative Technology Evaluation (MITE) program, which would evaluate new, privately developed technologies. Goals for the MITE program would be to foster development of improved product substitution, provide up-to-date cost/effectiveness information on innovative new equipment and techniques for managing wastes, and accelerate commercialization of these techniques and technologies.

EPA Mobile Incineration System

The EPA Mobile Incineration System, presently located at the Denney Farm site in Missouri, has treated 8.5 million pounds of waste material from the eight dioxin sites in southwestern Missouri as of October 1988. Ongoing budgeted incineration activities are projected to be completed in mid-December 1988. In addition, an application to permit the incineration of EPA-owned, cancelled 2,4,5-T and silvex pesticides at the Denney Farm site has been submitted by EPA to the State of Missouri. This request has neither been approved nor denied; however, a recent letter from the Director of the Missouri Department of Natural Resources states that the request will not be granted without the concurrence of the local communities, which are currently opposed to the activity. In either event, when incineration activities at Denney Farm are complete, the site must be closed. The system will then be transported from the site to another as yet undetermined location. The cost for closure activities is estimated to be between

Office of Environmental Engineering and Technology Demonstration

\$1.4 and \$2 million, and the cost for transportation of the unit to its next destination is estimated to be \$50K. Before mid-December, it must be decided how the site will be closed and how the closure costs will be covered.

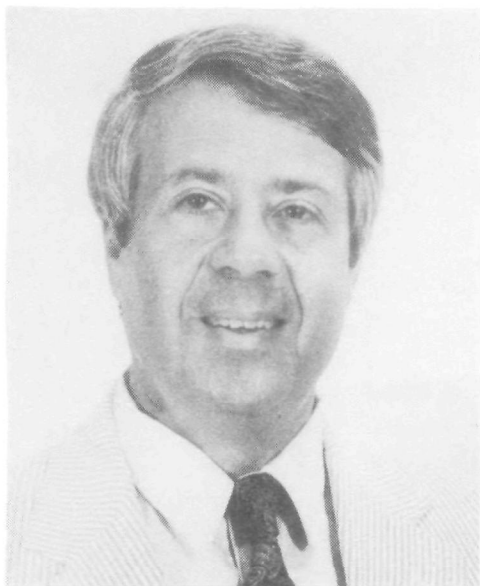
development of new technologies that can ultimately be demonstrated in the program need to be put into action. The EPA funds should be leveraged with State and other Federal Agency programs in order to attract more technologies at a lower cost to EPA.

Superfund Innovative Technology Evaluation (SITE) Demonstration Program

The SITE demonstration program represents a unique partnership between the USEPA and technology developers. The objective of this program is to encourage the use of improved technologies for the permanent remedy of uncontrolled hazardous waste sites through the development of objective cost and performance information on developing and emerging cleanup technologies. Congressional oversight hearings on the SITE program may be forthcoming in FY 89. The program has focused along three lines: (1) a full-scale demonstration program; (2) an emerging technologies development program; and (3) innovative technologies development within the USEPA. Twenty-eight technologies have been selected for demonstration, six of which are completed; the remaining technologies should be demonstrated in FY 89. An additional ten or more new technologies will be selected in 1989. The emerging technologies program has selected seven technologies that are currently undergoing testing. A second solicitation has been made, and 16 technologies are undergoing review. As part of the innovative technologies program, three technologies developed by EPA have been selected for transfer to commercial use that will benefit both the hazardous waste industry and the American public. EPA will enter into a partnership with commercial users to further develop and commercialize these three mobile systems. A major focus of the SITE program is the rapid dissemination of demonstration results to the EPA Regions and States via the Superfund Clearinghouse.

To make the SITE program more timely, institutional barriers within EPA that cause great time delays in conducting demonstrations must be minimized or eliminated. Now that results of the demonstrations are becoming available, effective means must be found to transfer this information to the Regions, States, and individuals making cleanup decisions. New and innovative ways to encourage further

Air and Energy Engineering Research Laboratory



Frank T. Princiotta is the Director of the Air and Energy Engineering Research Laboratory (AEERL), Research Triangle Park, NC. He has served as a Division Director of ORD's Office of Environmental Engineering and Technology. Prior to going to EPA Headquarters in 1975, he was Chief of AEERL's Engineering Test Section. Princiotta's career includes engineering positions with Hittman Associates and the U.S. Atomic Energy Commission's New York Operations. EPA has awarded him a Gold Medal, three Bronze Medals and the President's Rank of Meritorious Executive. Princiotta has a B.S. in Chemical Engineering from City College of New York.

Functions

The mission of the Air and Energy Engineering Research Laboratory (AEERL) is to research, develop and demonstrate methods and technologies for controlling air pollution from stationary sources. Among these stationary sources are electric power plants, manufacturing and processing industries, and incinerators. The Laboratory does not deal with pollution from mobile sources or nuclear power plants.

Staffed primarily by engineers, the Laboratory creates and improves air pollution control equipment, seeks means of preventing or reducing pollution through changes in industrial processes, develops predictive models and emissions inventories, identifies and assesses the importance of air pollution sources, and conducts fundamental research to define the mechanisms by which processes, equipment, and fuel combustion produce air pollution.

Currently, AEERL is concentrating its efforts in eight main program areas, which are briefly described below:

- **Acid Rain:** Developing means of controlling acid rain precursors, SO_2 and NO_x , including the Limestone Injection Multistage Burner; developing models that will identify the best possible control alternatives for various scenarios, and developing inventories of acid rain precursor emissions.
- **Air Toxics:** Developing control technologies for volatile organic compounds (VOCs); identifying sources of VOCs; developing improved designs that will achieve better control of woodstove emissions; and developing computerized advisory systems that will, for instance, assist permit writers in making decisions about new industries or that will assist local emergency planning committees in preparing for accidental releases of hazardous chemicals.
- **Hazardous Wastes:** Studying the fundamental combustion mechanisms that influence thermal destruction of hazardous wastes. Included are studies of droplet atomization of liquid wastes, failure modes in a small pilot-scale rotary kiln, and small pilot-scale studies of fluidized-bed incineration.
- **Indoor Air Quality:** Developing and demonstrating means of reducing the entry of naturally occurring radon into houses, schools and other public buildings. Studying building materials and consumer products as sources of indoor air pollution.
- **Municipal Waste Combustion:** Developing means of minimizing pollutant formation during combustion, and determining the effectiveness of various devices in controlling air pollution from municipal waste incinerators.

Air and Energy Engineering Research Laboratory

- **Ozone Non-Attainment:** Developing strategies, process modifications and improved technologies that will prevent, or reduce, the emission of hydrocarbons, nitrogen oxides and VOCs.
- **Stratospheric Ozone:** Evaluating the importance of various chlorofluorocarbons and other substances in depleting the Earth's protective ozone layer, and seeking to identify and recommend substitutes for depleting substances that are now in use.
- **Global Climate Change:** Evaluating the importance of various substances (carbon dioxide, methane, nitrous oxide) as causes of global climate change and seeking innovative solutions to the problem. Also planned is the development of predictive models and inventories of emissions that are contributing to global climate change.

FY88 Products

1987 Assessment Models: AUSM (Advanced Utility Simulation Model), ICE (Industrial Combustion Emissions Model), PROMPT, and VOC

Controllability of Toxic Metal Emissions by Particle Controls

Application of Radon Reduction Methods (companion to "Radon Reduction Techniques for Detached Houses - Technical Guidance")

Radon Reduction Methods - A Homeowner's Guide
Organic Emissions from Indoor Materials and Factors Affecting Emission Rates and Composition
Organic Emissions from Unvented Space Heaters

Mutagenic and Tracer Emissions from Phase II Indoor Air Cancer Project Wood Stove Field Study

Nationally-Oriented Prevention Reference Manuals for Three to Six of the High Hazard Air Toxic Chemicals

Reduction of VOC Emissions from Surface Coating Operations via Process Modifications

Field Study of Efficiency Degradation of Wood Stove Catalysts

Control of Ethylene Oxide Emissions from Hospital Sterilizers

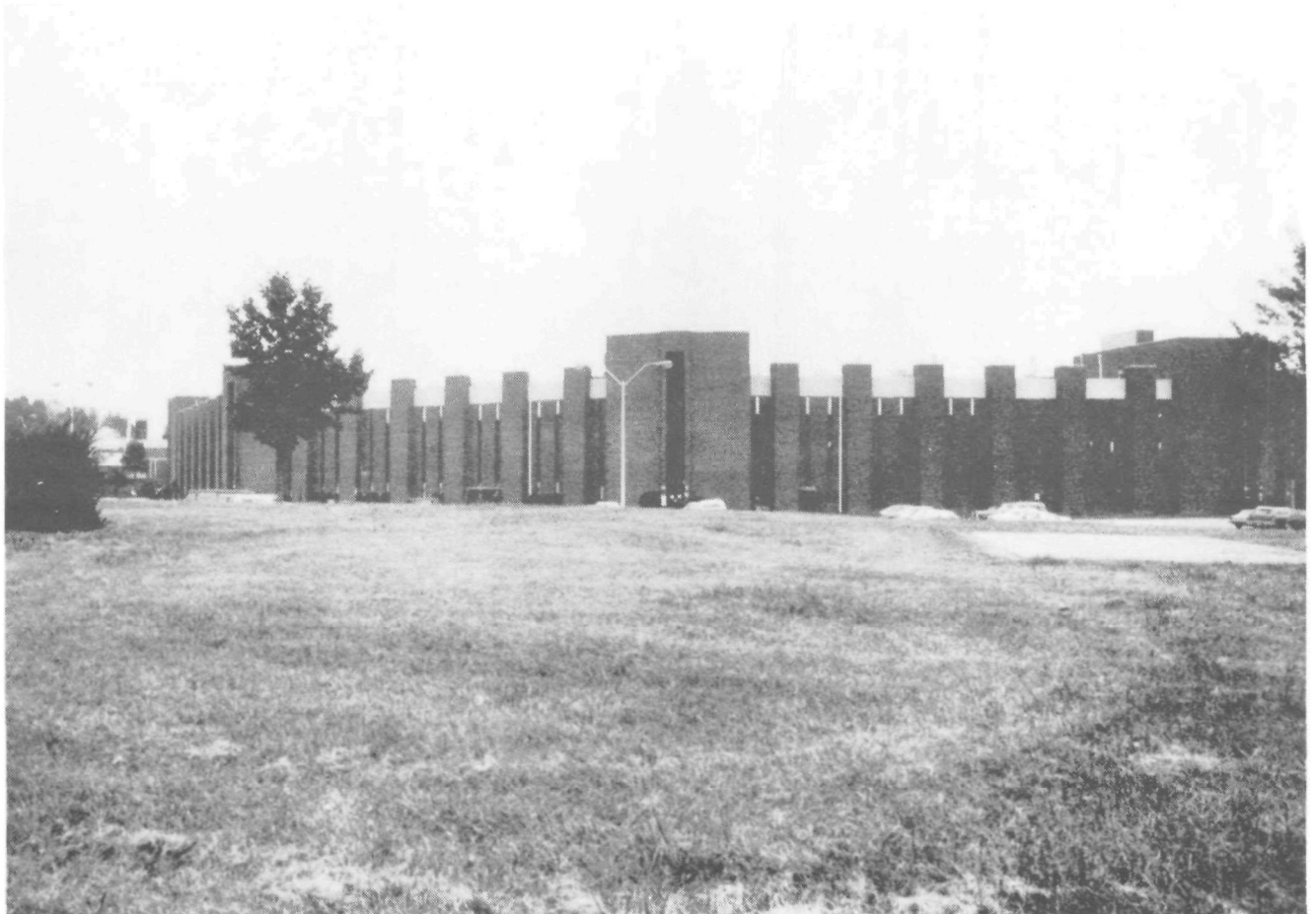
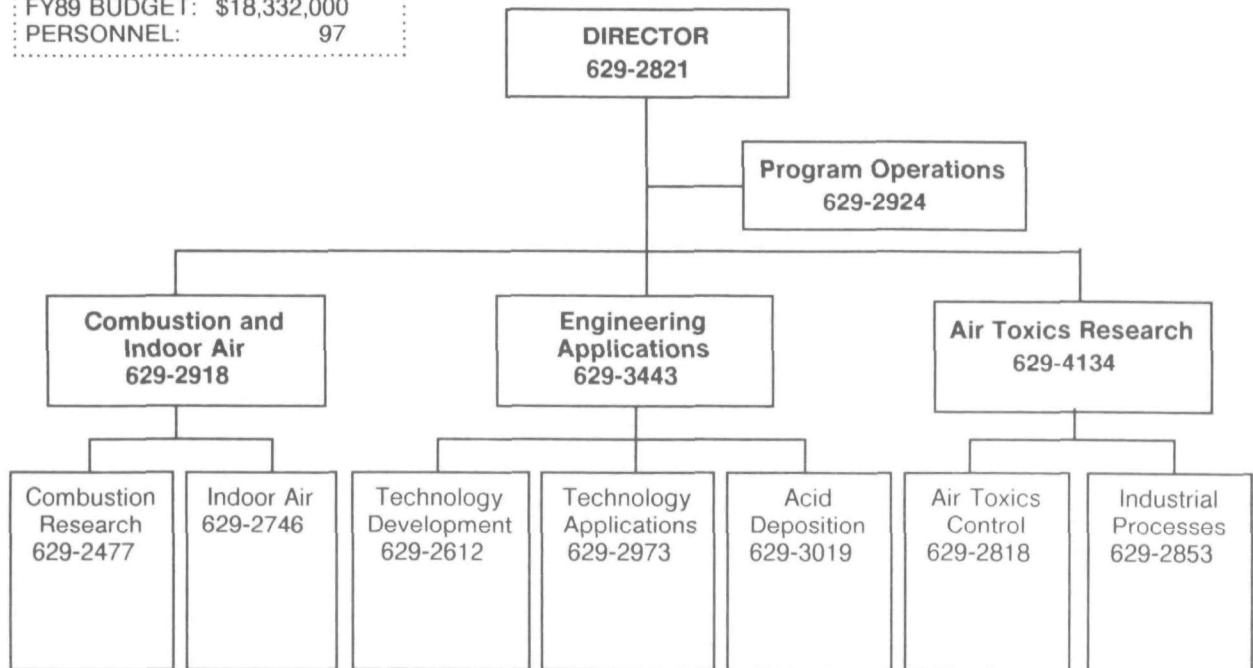
Scale-up Criteria for LIMB Tangentially-Fired System

Most Important Publication

Radon Reduction Techniques for Detached Houses - Technical Guidance (Second Edition)

Air and Energy Engineering Research Laboratory

FY89 BUDGET: \$18,332,000
PERSONNEL: 97



Risk Reduction Engineering Laboratory



E. Timothy Oppelt has been the Acting Director of the Risk Reduction Engineering Laboratory since August 1988. From 1979 to July 1988, he held supervisory positions within EPA in the Municipal Environmental Research Laboratory, Hazardous Waste Engineering Research Laboratory, and Waste Management Division, Region V. He received an MBA degree from Xavier University and two degrees in Civil Engineering from Cornell University: a bachelor's and master's. He was awarded the EPA Bronze and Silver Medals.

Functions

The mission and function of the Risk Reduction Engineering Laboratory (RREL) is to provide an authoritative, defensible, engineering basis in support of the policies, programs and regulations of the U.S. Environmental Protection Agency with respect to drinking water, hazardous wastes, pesticides, Superfund, toxics, and wastewater. Research and technical assistance/support are conducted in the following specific areas:

- *Drinking Water:* Engineering solutions for the treatment, distribution, and preservation of public drinking water supplies.
- *Hazardous Wastes:* Research in incineration, land disposal practices, and to determine existing and emerging alternatives for treating, detoxifying, volume reduction and waste minimization of hazardous materials and municipal solid wastes.
- *LUST Trust Fund Technical Support:* Technical assistance on corrective action, site assessments, decision tools and cleanup technologies to LUST Trust Fund administrators and implementors.
- *Pesticides:* Technical support to the Office of Pesticide Programs for technological

alternatives for disposal of cancelled and suspended pesticides, and to provide data and guidance on the capabilities of protective clothing for reducing working exposure to pesticides.

- *Superfund:* Technologies for response and remedial action for supporting enforcement actions and protecting personnel involved in cleanup. Superfund Innovative Technology Evaluation (SITE) program to enhance development and demonstration of innovative technologies as alternatives to containment.
- *Toxics Chemical Testing and Assessment:* Alternatives for regulating the manufacture and use of existing chemicals (including asbestos); assessing release and exposure in review of Pre-manufacturing Notices (PMNs) for new chemicals; and techniques and devices to contain and destroy genetically engineered organisms.
- *Wastewater (Municipal and Industrial):* Cost-effective methods for the prevention, treatment and management of municipal wastewater, sludges and urban runoffs, and industrial processing, manufacturing, and toxic discharges.

Risk Reduction Engineering Laboratory

FY88 Products

Completed evaluations of five technologies for the Superfund Best Demonstrated Available Technology (BDAT) program for contaminated soils.

Completed tests of Best Demonstrated Available Treatment (BDAT) technologies for two hazardous waste streams in support of OSW regulatory development.

Completed six Superfund Innovative Technology Evaluations (SITE) program demonstrations and admitted nine new technologies into the demonstration program.

Completed Technical Resource Document update on "The Lining of Waste Impoundments and Disposal Facilities."

Developed a Treatability Data Base.

Developed a Municipal Toxicity Reduction Evaluation (TRE) Protocol.

Field Studies of the Effectiveness of Protective Clothing for Agricultural Pesticide Operations.

Report on Assessment of Asbestos Removal Under Latest Guidance Conditions.

Report on Azo Dye Adsorption Isotherm Method Development and Validation.

Report on the Destruction of Organics in Co-Fired Boilers.

Report on All Virus Inactivation Data Developed to date on the Inactivation of Hepatitis A Virus (HAV).

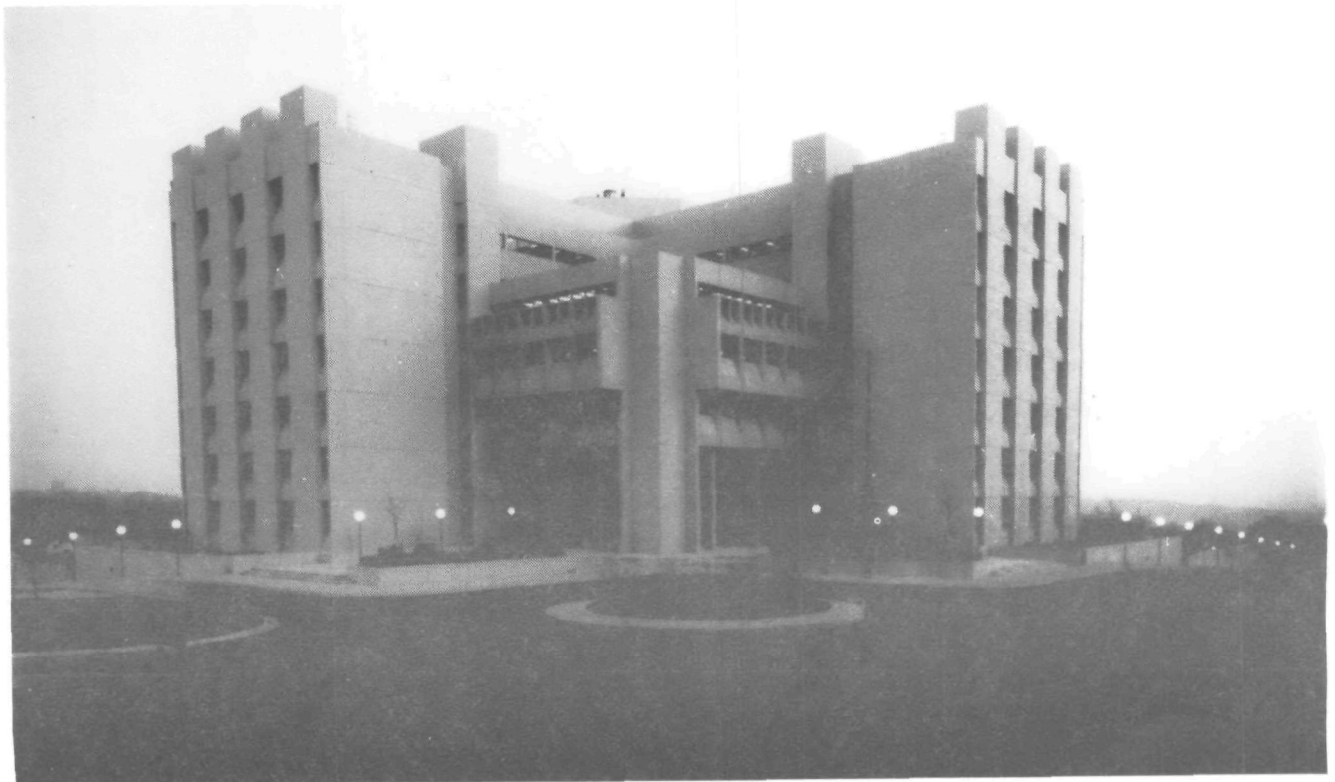
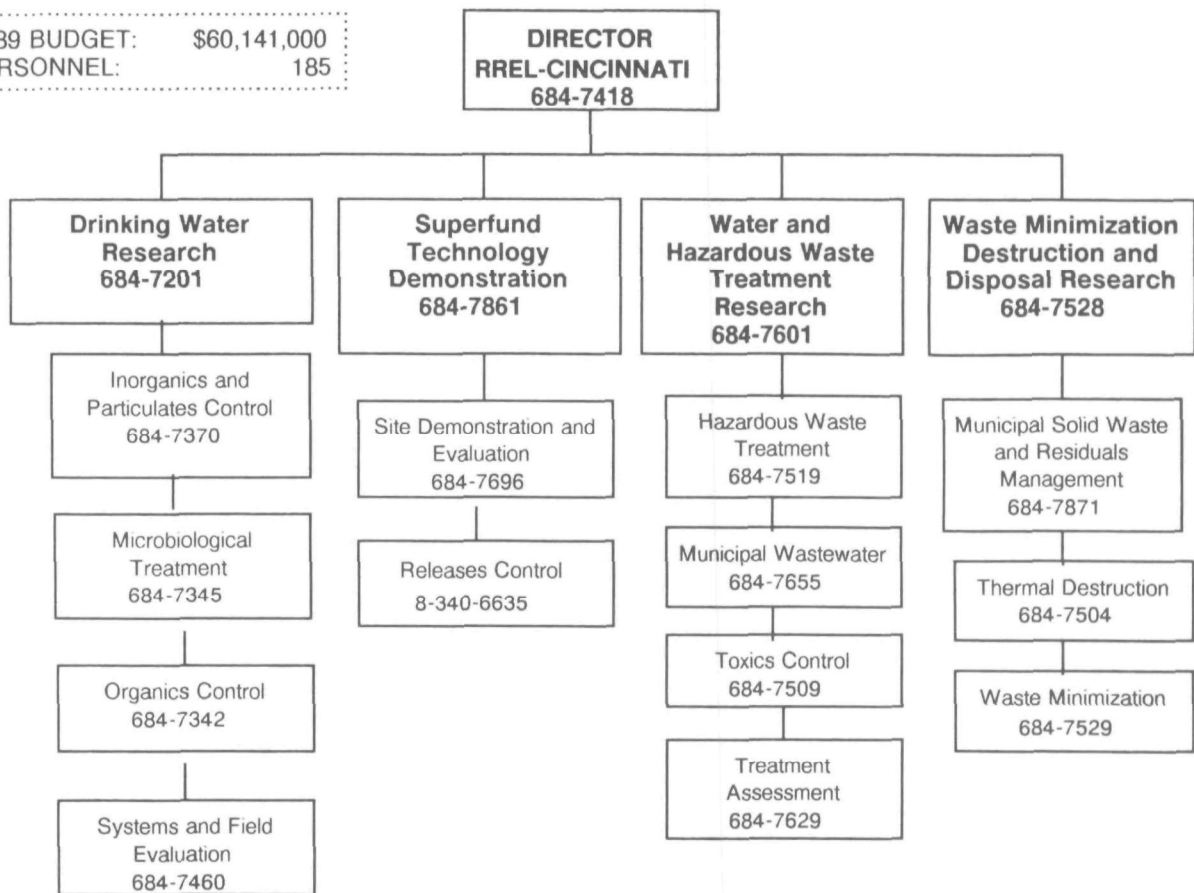
Report on Removal of Radon with Low Cost/Low Technology Treatment Techniques.

Most Important Publication

The EPA Manual for Waste Minimization Opportunity Assessments

Risk Reduction Engineering Laboratory

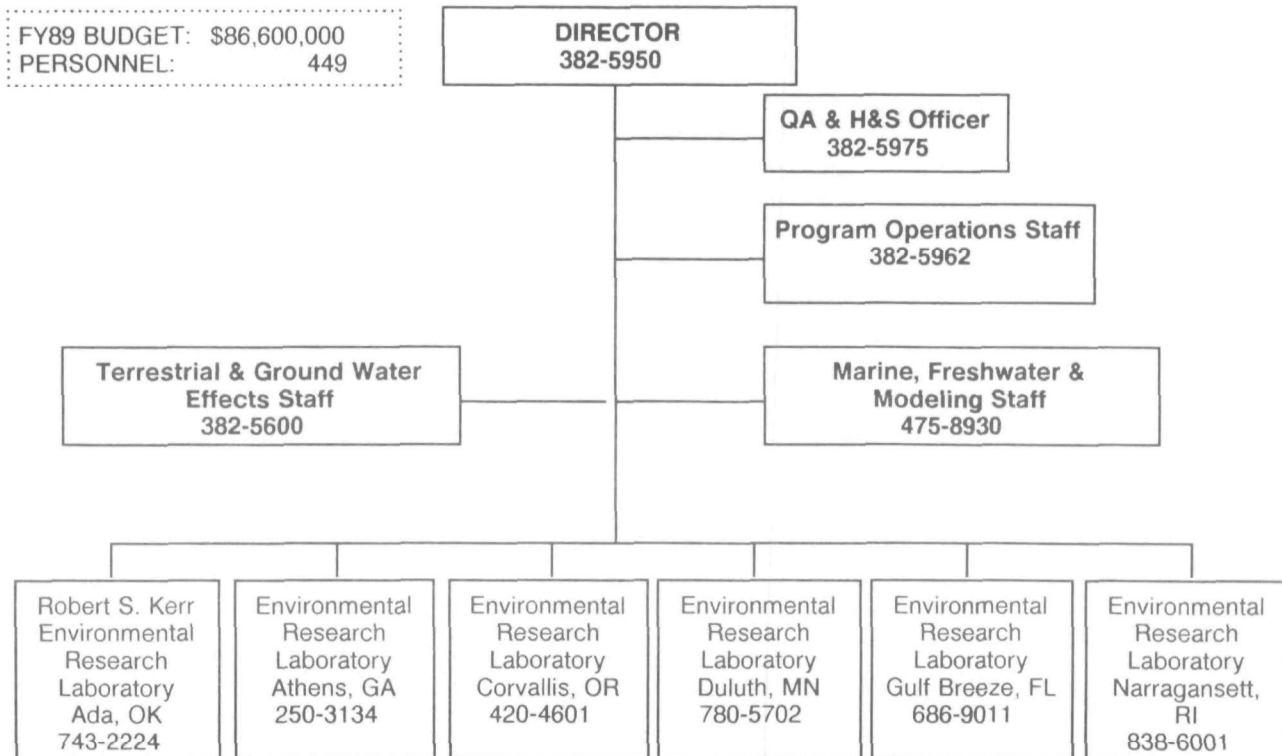
FY89 BUDGET: \$60,141,000
PERSONNEL: 185



Office of Environmental Processes and Effects Research



Courtney Riordan is the Director of the Office of Environmental Processes and Effects Research. His prior experience with EPA includes Director, Office of Acid Deposition, Environmental Monitoring and Quality Assurance; Acting Assistant Administrator, Office of Research and Development; Director, Office of Monitoring Systems and Quality Assurance; Associate Director, Office of Air, Land, and Water Use. Dr. Riordan received a bachelor's degree in Civil Engineering from Northeastern University in Boston, a Ph.D. in Regional Planning and Systems Analysis from Cornell University in Ithaca, New York, and a J.D. from George Washington University.



Office of Environmental Processes and Effects Research

Functions

The Office of Environmental Processes and Effects Research (OEPER) develops from an ecosystems perspective data and scientific and technological methods necessary to understand, predict, and manage the entry, movement, and disposition of residuals (including biologicals) in the environmental media--atmosphere, soil, ground water, and surface water--and in the food chain, and to determine their effects on organisms and higher levels of integration. Programs range from fundamental process research critical for defining the ecological effects of microbial and chemical pollutants, acid deposition, products of bioengineering, global climate changes, and loss of stratospheric ozone, to systems and decision modeling, wetlands, marine systems, terrestrial and surface freshwater environments, and ecological risk assessment methods. Another emphasis area focuses on the determination of the status of and changes in critical ecological resources, as represented by landscape systems in the United States and internationally. OEPER provides technical support to the regions and the states in environmental science and technology to assist in problem solving and transfers information and technology to users.

Program Activities

- Global Warming - The potential effects of a global warming induced by radiatively important trace gases are both drastic and uncertain. The range of consequences may well affect all factors of human existence, including air and water quality, distribution or even survival of vegetation types and wildlife, shifts or loss of marine and freshwater fisheries, and productivity of agricultural and forested lands. The Global Climate Change Research Program will investigate and estimate the likely magnitude, timing and regional expressions of these effects, including their relationships to sources and sinks of the trace gases associated with climate change.
- Stratospheric Ozone - For the newly ratified Montreal Protocol on Substances that Deplete the Ozone Layer to be successful on a global scale, it is essential that EPA provide scientifically credible input into the risk characterization and scientific assessment mandated by the Protocol and supported by

the United States. The Agency's research and development program plays a vital role in generating the scientific information that is critically important for the risk assessments and regulations being promulgated by policy-makers both domestically and internationally.

- Water Quality Based Approach - In the transition from a technology based control of toxics to a Water Quality Based Approach (WQBA) control of toxics in water many problems/issues have been addressed but others still remain. The research supporting the WQBA to the permitting of pollutant discharges into freshwater, estuarine and marine aquatic environments has two major approaches: (1) developing water quality criteria for individual contaminants, adapting the criteria to site-specific or ecoregional conditions, and developing modeling techniques to relate criteria to allowable discharges; and (2) developing methods for evaluating the toxic components of complex effluents and predicting maximum safe chronic contaminant levels using environmental endpoints.
- Marine, Estuaries and Great Lakes - Methodologies and information are needed for the development of responsive and scientifically valid ocean disposal (ocean dumping and discharge through outfalls), estuarine and Great Lakes programs. Research focuses on developing methodologies for predicting contaminant movement and fate, exposures, and effects of contaminants on organisms, communities, and ecosystems in sediments, freshwater, marine, and estuarine environments to permit better evaluation of pollutant impacts and make regulatory decisions.
- Ground Water - There is much uncertainty as to the exposure of humans to contaminated ground water and the effects of the exposure on human health. Unregulated contaminants that pose a hazard to human health are being identified and analyzed for as an ongoing activity and studies on the fate and transport of contaminants will continue. There is a continuing need to understand the

Office of Environmental Processes and Effects Research

relationship of ground water contamination to the human health issue in order to decrease the uncertainties linking contaminants to human health.

The clean-up and restoration of contaminated ground water is an issue of prime importance. One mode of clean-up utilizes natural processes, such as bacterial degeneration of contaminants. The manipulation of natural process for ground water clean-up is an application that requires ongoing research and development.

- **Waste Characterization** - Waste characterization research is conducted under the hazardous waste research program to provide information on the fate and effects of these chemicals in the environment. The Office of Solid Waste and Emergency Response uses this information in its risk assessment listing, siting, and land disposal restriction programs.

- **Ecological Systems**

Field Validation: To determine if laboratory methods, results and simulation models reflect the true impacts of pesticides and toxic substances in natural situations, field validation studies are necessary. These studies, conducted in marine/estuarine, freshwater and terrestrial habitats, incorporate data on biotic responses, interactions and on ecological processes that prove or disprove laboratory approaches and findings and form the basis for suggestions on alternative or modified evaluative approaches.

Ecotoxicity: To evaluate toxic substances under TSCA and to register pesticides under FIFRA it is necessary to understand how the toxicant moves into or through the biotic and the physical portion of an ecosystem, the duration of exposure of the biota, the mode of toxicological action, the residues, the response of the receptor biota, ecosystem composition and processes and the eventual dispersion of the toxicant in the general matrix where the biota reside. Research is addressing these problems through development of testing

schemes and protocols, physiological experimentation, exposure studies, and comparative toxicological and ecosystem level studies.

Risk Assessment: When pesticides or toxic substances are used or accidentally released into the environment there is a need to be able to evaluate the risks to our ecosystems. Research is providing validated methods, predictive mathematical models, exposure and effects data, applications and consultations. Using these tools, assessments can be conducted for a given situation that indicates the degree of risk that can be expected. This information factors into Agency regulatory decisions.

Reducing Uncertainties in Risk Assessment (RURA): There is a need for improved risk assessments across many programs. This research proposes to incorporate monitoring and trend status with ecological evaluations of selected critical ecosystems and thus be able to predict the impacts (risk) of cumulative and multiple contaminant sources on ecosystem structure and function. Presently, risk for portions of systems can only be determined. To ensure that predictions and findings are reliable requires that extensive studies start by covering important key items such as hazards and exposure and response assessments and risk characterization with improvements at the ecosystem level.

Biotechnology Risk Assessment: The development of the biotechnology industry has raised many questions about potential adverse effects on ecology and ecosystems as a result of industrial utilization and release of genetically engineered organisms. The Agency is presently involved in establishing regulations for use of such organisms under TSCA and FIFRA. The research program is providing the Agency with methods for assessing the potential risk resulting from introducing engineered microorganisms into the environment. The three program areas being investigated are: (1) exposure - detection and enumeration under field conditions, transport in the environment, survival and colonization, genetic exchange; (2) effects on ecosystem processes, on higher organisms

Office of Environmental Processes and Effects Research

(animals and plants); and (3) risk control - design of field release, mitigation of adverse effects in field situations.

Environmental Monitoring and Assessment Program (EMAP): To prevent unwanted or irreversible damage to our ecosystem, EPA must know their current status, be able to determine trends in their health or deterioration and be in a position to manage these systems to realize continued benefits. Research is proposed that will classify, characterize and monitor status and trends of important ecosystems and their subclasses. Additionally, ecological research will commence on agricultural, forest, freshwater wetlands, near coastal and water quality limited stream/lake systems. Studies would include selecting systems and critical indicator endpoints, identifying hazards, assessing exposure, and applying state-of-the-art approaches for risk evaluations and reduction at regional levels. Applying this information augmented by other data bases will offer management options.

- **Structure Activity Relationships (SARs) -** Evaluation of each chemical is required under TSCA and FIFRA. These evaluations can require extensive time and resources. An alternate, more rapid approach is to compare the chemical with those of its chemical class having known similar molecular structure and chemical activity. Using a computerized data base and SAR models has proven to be of great value for the Agency. The data base and the system are undergoing expanded application to accommodate increasing numbers of new chemicals, reevaluation of old chemicals and enhancements to handle complex SARs for evaluating the fate and toxicity of chemicals in the environment. Many of the models will be available to States and Regional EPA offices in the coming year over the Office of Information Resource Management Network. A new program for the development of advanced SAR techniques, particularly in the area of quantitative molecular similarity analysis, is being planned to further decrease the man-hours involved in chemical evaluations.
- **Acid Deposition -** EPA's Acid Deposition Research Program includes research to 1) estimate emissions from manmade

sources, 2) understand atmospheric processes, 3) establish deposition monitoring data bases, 4) understand and quantify aquatic effects, 5) understand and quantify terrestrial effects, 6) understand and quantify the effects on materials, and 7) evaluate control technologies (to fulfill the needs expressed in the Energy and Security Act of 1980, Title VII).

In 1990, EPA in conjunction with the National Acid Precipitation Assessment Program (NAPAP), an interagency research coordination and assessment group chaired by the Administrator of EPA, will produce a final assessment of the sources, extent, and magnitude of environmental effects due to acid deposition, and the scientific uncertainties associated with acid deposition cause-effect relationships. The 1990 assessment will provide a better basis upon which to evaluate the needs for as well as the effectiveness and efficiencies of proposed abatement and control programs (in accordance with the Acid Precipitation Act of 1980, P.L. 96-294).

Issues

Stratospheric Ozone

For the Montreal protocol to be successful on a world-wide basis, it must be demonstrated to China, India, and other non-signatory, newly industrialized and lesser developed countries that depletion of stratospheric ozone will have an impact on their citizens. Also, even if a total phase-out of regulated CFCs occurs, there will be some depletion of the ozone layer. Research is required to provide impact scenarios for mitigative options.

Global Warming

Although research to date has suggested that a rise in the earth's temperature will occur, we only know what the average change may be. We must develop the ability to predict climatic changes on regional levels. In addition, changes of the magnitude predicted will have dramatic effects on air and water quality. We must develop a sound scientific understanding of the mechanisms and subsequent potential implications of global climate change so that we can prepare to adjust both our regulatory and non-regulatory strategies to be responsive to different fundamental environmental conditions.

Office of Environmental Processes and Effects Research

Ground Water Research

We understand that the U.S. Department of Agriculture intends to increase its ground-water contamination research by \$10 million. We need to assure this is closely coordinated with research in EPA. In addition, in the past session of Congress, a number of bills were introduced dealing with ground-water research, not only in EPA but also in the U.S. Geological Survey and the Department of Agriculture. These need to be watched closely.

Waste Characterization

We need to make sure that improved cleanup technologies resulting from ongoing research are implemented as soon as possible. Currently, millions of dollars are being spent annually on cleaning up contaminated ground water by pumping out the liquid and treating it chemically, physically, or biologically on the surface. Not only is this expensive, but recent studies have indicated how ineffective this technique can be. Many organic contaminants bind tightly to soil particles and resist removal when the contaminated ground water is pumped.

Pollution situations such as these may best be remedied by treating the contaminants in situ, that is, right in the soil matrix without attempts at excavation or pumping, by using microorganisms for biodegradation. Such techniques are applicable to hazardous waste and Superfund sites and to leaking underground storage tank contamination situations.

Ecological Systems

The successful determination of the ecological status and future trends in biological systems requires a management commitment of resources for periods of 10 or more years. This commitment is necessary because perturbations in biological systems often are of long-term developmental duration. In order to accomplish these objectives, extramural assistance from other governmental programs and academic institutions will be required. There is considerable suspicion in many sectors about whether EPA can, in fact, make such long-term commitments. Past performance has not been convincing.

Marine Estuaries and Great Lakes

The current ocean disposal research program responds to program office and regional needs as they relate to ocean dumping and to needs associated with ocean discharges through ocean

outfalls. Recently Congress passed a ban on the ocean dumping of sewage sludge and industrial wastes. Although this ban does not impact the ocean dumping of dredged material, ocean dumping monitoring activities, or activities associated with the discharge of wastes through ocean outfalls, it is expected that attempts will be made to eliminate or reduce ORD's entire ocean disposal research program.

Water Quality Based Approach

Although contaminated sediments are frequently identified as major environmental problems, concern has been expressed that effective regulatory tools or strategies (e.g., water quality criteria) are not available to address the contaminated sediment problems. This issue is likely to put significant demands on ORD research programs.

Recent amendments to the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA) have required EPA to expand or start new programs and regulatory efforts. These requirements will place many demands on the associated research programs, and some of these demands will not be met. For example, the CWA Amendments require significant involvement in non-point sources of pollution (NPS). Currently, ORD does not have a NPS research program. This will continue to be an important issue.

Acid Deposition

The question of acid rain control has been a major environmental issue during the 1980's, with significant implications relative to U.S. - Canadian relationships. Significant research progress has been made on this issue, most notably a 10-year U.S. interagency effort--the National Acid Precipitation Assessment Program (NAPAP)--scheduled for completion in 1990. We know more about this issue now than we have known in the past. The most comprehensive assessment will be the 1990 NAPAP assessment. Significant environmental and economic implications are involved in any decisions of how to control acid deposition. However, in order to obtain maximum environmental benefits from minimal costs, acid rain research will need to be continued even after a national acid rain control program is implemented. Such research will need to address:

- updates of emissions inventories
- verification, maintenance and application of emissions, deposition, and effects models

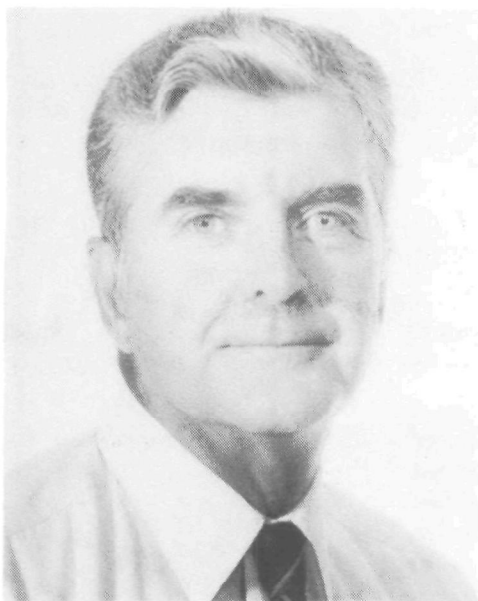
Office of Environmental Processes and Effects Research

- deposition and environmental effects and trends monitoring.

Biotechnology Risk Assessment

The use of bioengineered organisms is a unique and rapidly evolving technology, and the research program has evolved correspondingly to meet the Agency's need in evaluating a diverse array of biotechnology products. With the introduction of transgenic plants (genes from a wide variety of organisms are being inserted into crop plants), questions of human health and impact on ecosystems arise necessitating continued cooperation among regulatory agencies.

Robert S. Kerr Environmental Research Laboratory



Clinton W. Hall is the Director of the Environmental Research Laboratory, Ada, Oklahoma, in which capacity he has served since 1980. From 1971 to 1979, Mr. Hall served in many Agency programs. Before joining EPA, he was a hydrologist for the Defense Intelligence Agency. He received a bachelor's degree from the University of Delaware and a master's degree in Groundwater Geology from the University of Connecticut. He participated in Advanced Graduate Study in Geophysics/ Geochemistry at Florida State University. He was awarded the EPA Bronze Medal in 1978.

Functions

The Robert S. Kerr Environmental Research Laboratory (RSKERL) serves as U.S. EPA's center for ground-water research, focusing its efforts on studies of the transport and fate of contaminants in the subsurface, development of methodologies for protection and restoration of ground-water quality, and evaluation of the applicability and limitations of using natural soil and subsurface processes for the treatment of hazardous wastes. The Laboratory has a long history of research responsibilities related to the use of soils and subsurface for waste treatment and to the protection of the soil, ground water and surface water. These responsibilities have included the development and demonstration of cost-effective methods for land treatment of municipal wastewaters, animal production wastes, and petroleum refining and petrochemical wastes, as well as the development of technologies for the protection of ground-water quality.

RSKERL carries out research through in-house projects and cooperative and interagency agreements with universities, national laboratories, and other research centers. RSKERL currently has over 80 ongoing or planned extramural projects at approximately 40 research institutions in 25 states.

An examination of the environmental legislation that relates to ground-water quality protection reveals four common regulatory or management requirements:

- Establishment of criteria for location, design, and operation of waste disposal activities to prevent contamination of ground water or movement of contaminants to points of withdrawal or discharge.
- Assessment of the probable impact of existing pollution on ground water at points of withdrawal or discharge.
- Development of remediation technologies which are effective in protecting and restoring ground water quality without being unnecessarily complex or costly, and without unduly restricting other land use activities.
- Regulation of the production, use, and/or disposal of specific chemicals possessing an unacceptably high potential for contaminating ground water when released to the subsurface.

These requirements translate into a need for definitive knowledge of the transport and fate characteristics of contaminants in subsurface environments, without the risk of (1) under-control resulting in excessive ground-water contamination,

Robert S. Kerr Environmental Research Laboratory

or (2) over-control resulting in uneconomical under-utilization of the subsurface as a treatment media. The mission of the RSKERL is to develop that data base.

FY88 Products

DRASTIC: A Standardized System for Evaluating Ground Water Pollution Potential Using Hydrogeologic Settings

"Equivalence of Microbial Biomass Measures Based on Membrane Lipid and Cell Wall Components, Adenosine Triphosphate, and Direct Counts in Subsurface Aquifer Sediments," *Microbial Ecology*

"Macromolecules Facilitate the Transport of Trace Organics," *The Science of the Total Environment*

"Organic Cation Effects on the Retention of Metals and Neutral Organic Compounds on Aquifer Material," *Journal of Environmental Science and Health*

Interactive Simulation of the Fate of Hazardous Chemicals During Land Treatment of Oily Wastes: Ritz User's Guide

Physics of Immiscible Flow in Porous Media

Bioplume II: Computer Model of Two-Dimensional Contaminant Transport Under the Influence of Oxygen Limited Biodegradation in Ground Water

A Field Evaluation of In-Situ Biodegradation for Aquifer Restoration

Leaking Underground Storage Tanks: Remediation with Emphasis on In Situ Bioremediation

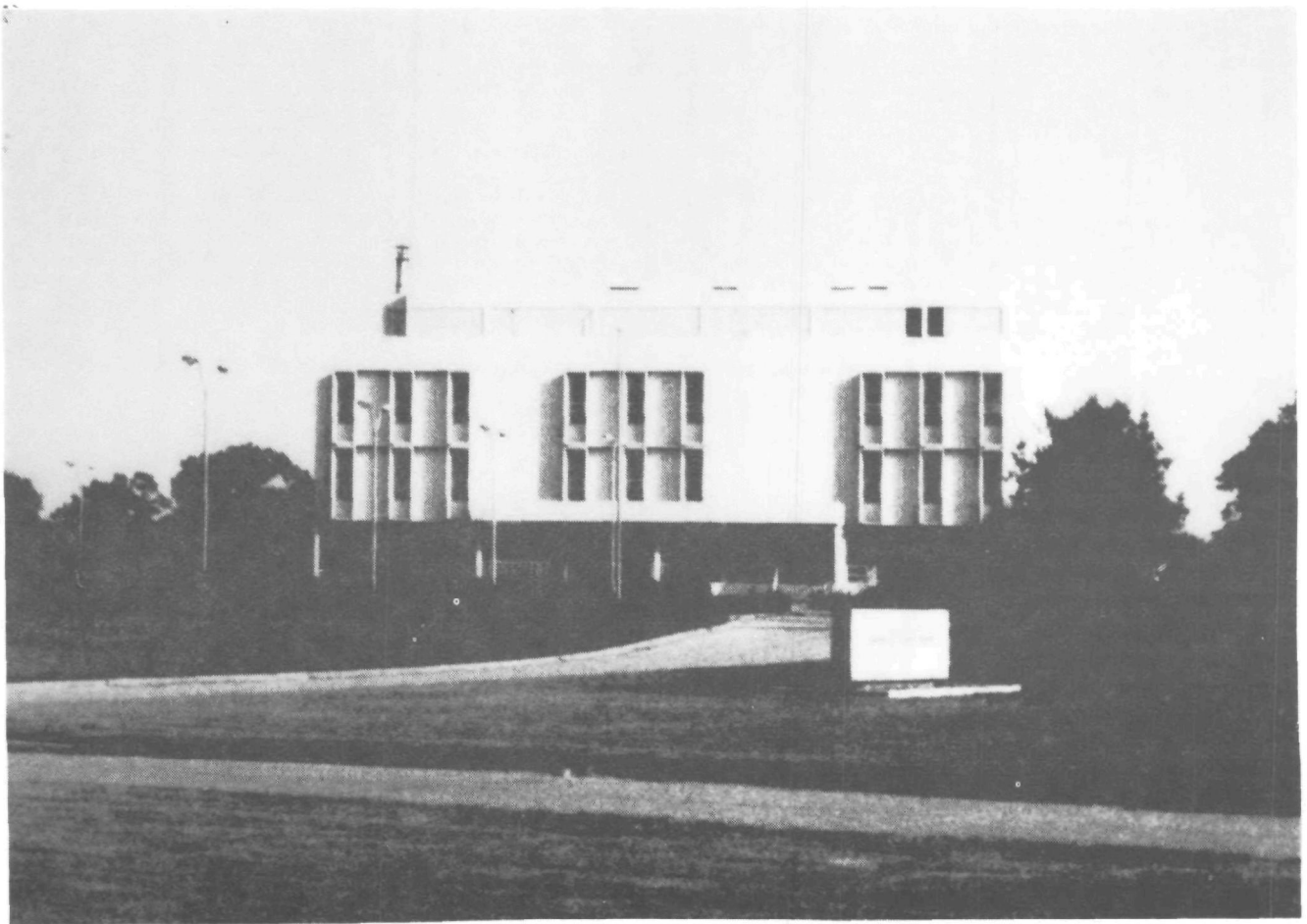
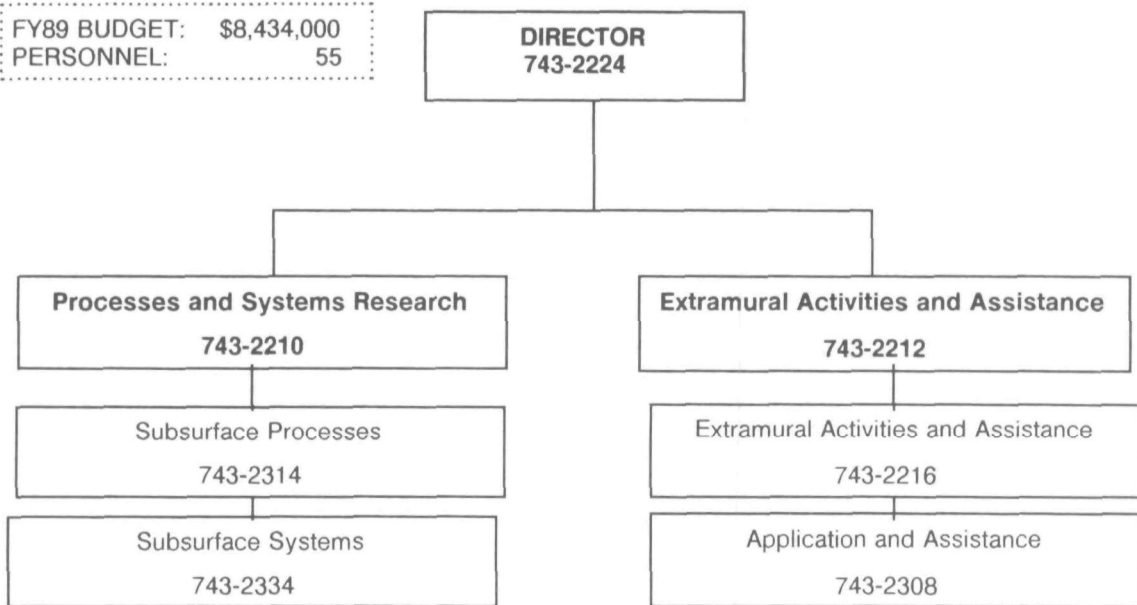
"Decay of Dissolved Substances by Second-Order Reaction. Problem Description and Batch-Reactor Solutions," *Journal of Environmental Science and Health*

Most Important Publication

"Sorption Nonequilibrium During Solute Transport," *Journal of Contaminant Hydrology*

Robert S. Kerr Environmental Research Laboratory

FY89 BUDGET: \$8,434,000
PERSONNEL: 55



Environmental Research Laboratory - Athens



Rosemarie C. Russo is the Director of the Environmental Research Laboratory at Athens, GA. She started with the Agency in 1978 as a Research Chemist at Duluth and later became Associate Director for Research Operations. Her career includes: Adjunct Professor and Associate Director at Montana State University; Senior Research Chemist, Colorado State University; Assistant Professor, Dickinson College, Carlisle, PA; Assistant Professor, Gettysburg College; and Instructor, University of Minnesota-Duluth. She received her B.S. in Chemistry from the University of Minnesota-Duluth and her Ph.D. in Inorganic Chemistry from the University of New Hampshire.

Functions

The Environmental Research Laboratory at Athens conducts and manages fundamental and applied research to predict and assess the human and environmental exposures and risks associated with conventional and toxic pollutants in water and soil. The research focus is predictive ecological science.

This research identifies and characterizes the natural biological and chemical processes that affect the environmental fate and effects of specific toxic substances, such as pesticides or metals. The results are applied in state-of-the-art mathematical models for assessing and managing environmental pollution problems.

Lab-developed data and assessment techniques support EPA's major programs in hazardous waste, pesticides, toxics, Superfund, and water quality. Staff expertise includes chemistry, computer science, ecology, engineering, and microbiology.

EPA's Center for Exposure Assessment Modeling (CEAM), an internationally known center of modeling expertise located at the Athens Lab, provides models, training, and support in exposure evaluation and ecological risk assessment. CEAM assists the Agency and States

in environmental risk-based decisions concerning the protection of surface water, soil, groundwater and air.

FY88 Products

Application of Expert Systems Technology in Water Quality Modeling

Characterizing Pesticide Distribution in Agricultural Settings

Estimating Sample Requirements for Field Evaluation of Pesticide Leaching

MINTEQA1, an Equilibrium Speciation Model

Modeling the Impact of Conservation Tillage Practices on Pesticide Concentrations in Ground and Surface Waters

Physiologically Structured Population Models in Risk Assessment

Predicting Chemical Reactivity by Computer

Risk of Unsaturated-Saturated Transport and Transformation Interactions for Chemical Concentrations (RUSTIC)

Environmental Research Laboratory - Athens

SARAH2, a Surface Water Assessment Model for Back Calculating Reductions in Abiotic Hazardous Waste

Uncertainty Analysis in Water Quality Modeling Using QUAL2E

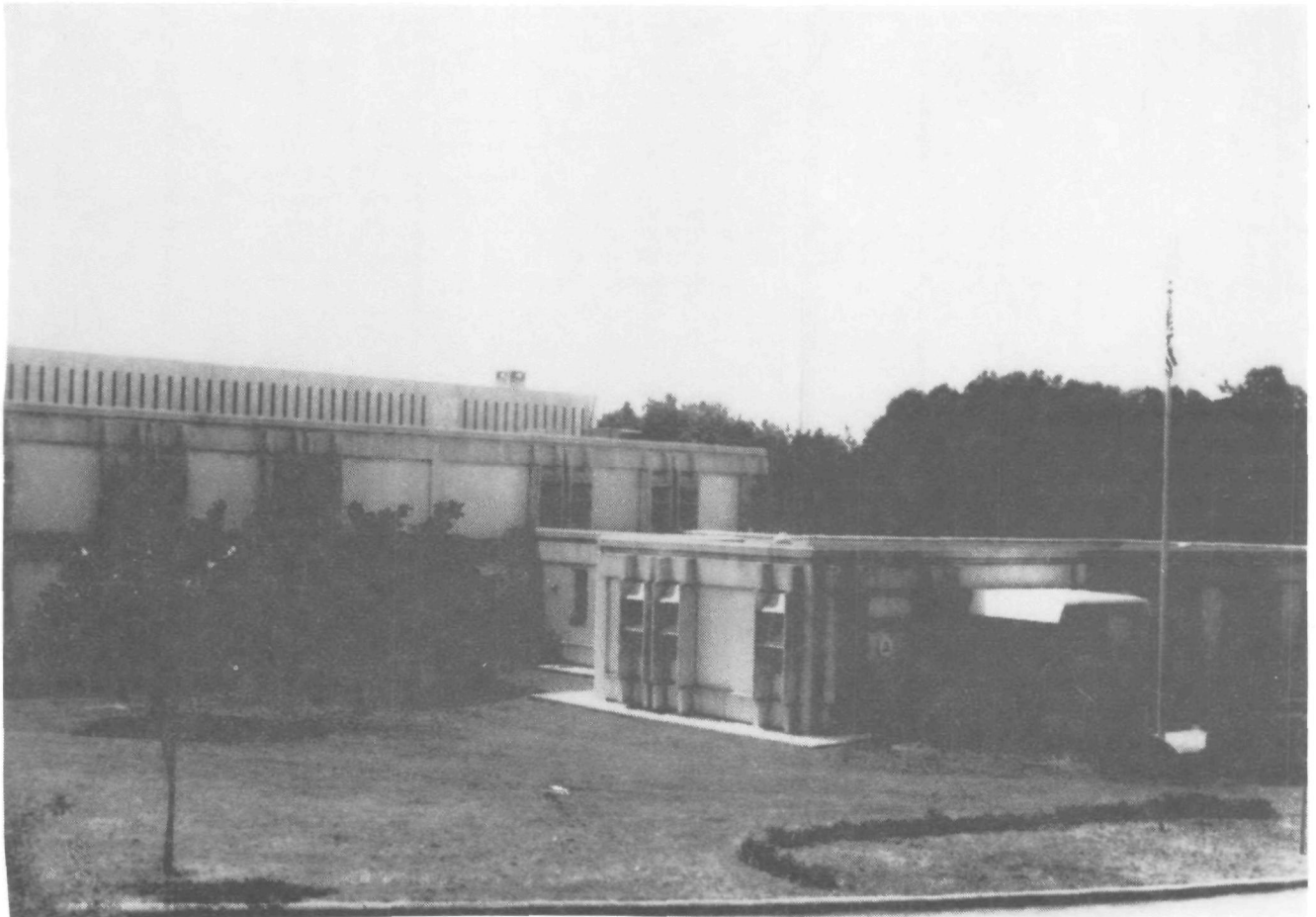
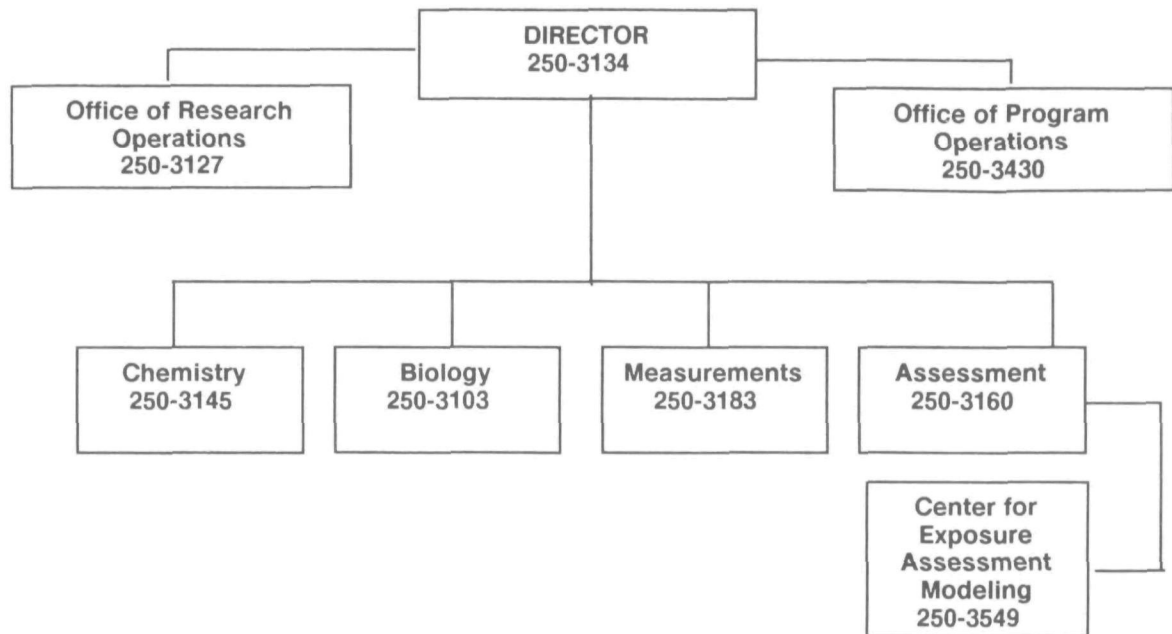
WASP4, a Hydrodynamic and Water Quality Model

Most Important Publication

FGETS (Food and Gill Exchange of Toxic Substances), a Simulation Model for Predicting Bioaccumulation of Nonpolar Organic Pollutants by Fish

Environmental Research Laboratory - Athens

FY89 BUDGET: \$8,168,000
PERSONNEL: 67



Environmental Research Laboratory - Corvallis



Thomas A. Murphy is the Director of the Environmental Research Laboratory at Corvallis, Oregon. He has been in Agency programs since 1970, including Nonpoint Source Division and Air, Land, Water Use. From 1967-1970 he was with the Federal Water Quality Administration. He received a master's degree in zoology and a Ph.D. degree in Biology from Yale. He received a bachelor's degree in biology and chemistry from Knox College, and a certificate in animal physiology from Glasgow University.

Functions

The Corvallis Laboratory conducts research and assessment on the effects of pollutants and other human stresses on inland ecological systems that include: plant and wildlife populations; soils and other microbial systems; forests, grasslands and agricultural systems; wetlands; watersheds; and regional landscapes. It also develops and evaluates methods for mitigating effects on and restoring inland ecological systems. The Laboratory provides the Agency's primary scientific expertise in terrestrial ecotoxicology and terrestrial, watershed and regional ecology. Current Laboratory activities include:

- effects of acidic deposition on surface waters and forests
- effects of tropospheric ozone on crops and forests
- effects of global climate change and stratospheric ozone depletion on ecological systems
- effects of toxic chemicals on wildlife and plants

- effects of genetically engineered organisms and microbial pest control agents on terrestrial ecological systems
- hazardous waste site ecological impact evaluation
- evaluation of cumulative wetland loss
- mitigation of wetland loss
- uptake, movement and metabolism of chemicals in plants
- regional analysis of ecosystem conditions and trends

FY88 Products

"Action Spectra and Their Key Role in Assessing Biological Consequences of Solar UV-B Radiation Change"

"Analysis of Crop Loss for Alternative Ozone Exposure Indices"

"Atmospheric Wet Sulfate Deposition and Lakewater Chemistry"

Environmental Research Laboratory - Corvallis

Characteristics of Lakes in the Western United States

"Database Assessment of Phytotoxicity Data Published on Terrestrial Vascular Plants"

"Ecoregions: An Approach to Surface Water Protection"

"Evaluation of Cumulative Effects on Wetland Functions"

Lake and Reservoir Management: A Guidance Manual

"Measuring Genetic Stability in Bacteria of Potential Use in Genetic Engineering"

Revised Protocol for Bioassessment of Hazardous Waste Sites

"Role of Dietary Choices on the Ability of Bobwhite to Discriminate Between Treated and Untreated Food"

"Statistical Analysis of Reported Growth Decline of Pine Species in the Southeast"

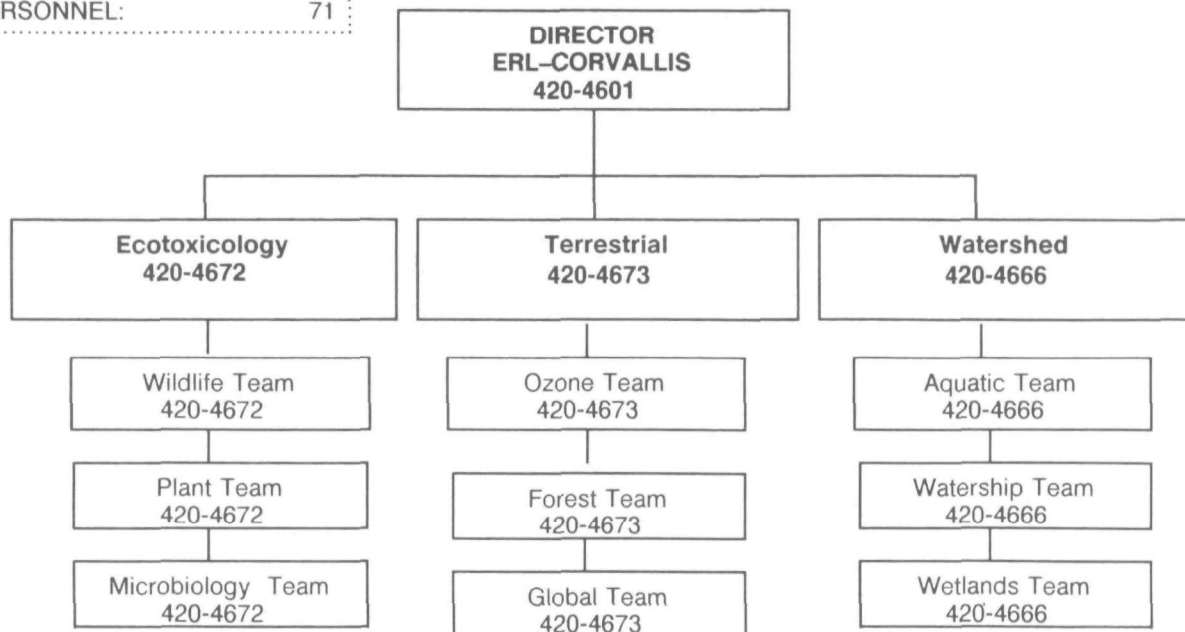
The Release of Ice Minus Recombinant Bacteria at California Test Sites

Most Important Publication

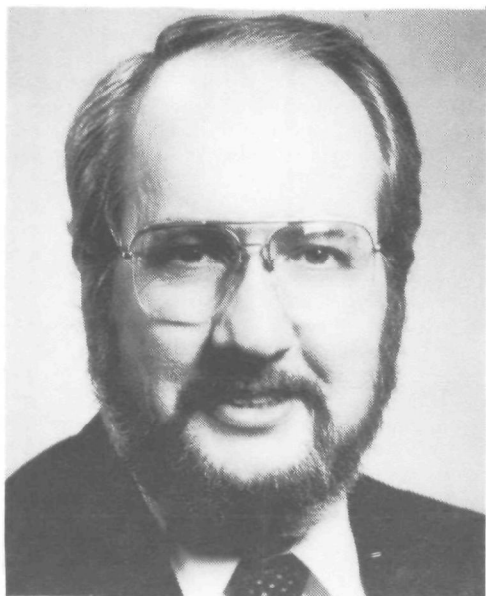
Chemical Characteristics of Streams in the Mid-Atlantic and Southeastern United States

Environmental Research Laboratory - Corvallis

FY89 BUDGET: \$24,326,000
PERSONNEL: 71



Environmental Research Laboratory – Duluth



Gilman D. Veith has been the Director of the Environmental Research Laboratory at Duluth (ERL-D) since 1987. He was Associate Director of Research from 1984-1987; Chief, Toxic Substances Research Branch, 1981-1984; and Research Chemist, 1972-1981. He began his career as an Assistant Professor of the Water Chemistry Program at the University of Wisconsin, Madison, Wisconsin. He was the Chemical Advisor on Environmental Criteria, World Health Organization, Geneva, Switzerland, and founder of the People's Republic of China/ERL-Duluth Scientific Exchange Program. Dr. Veith received his B.S. in chemistry from Augustana College and his Ph.D. in Water Chemistry from the University of Wisconsin. He has authored or co-authored nearly 50 scientific papers.

Functions

The Environmental Research Laboratory at Duluth (ERL-D) conducts research to advance our fundamental understanding of aquatic toxicology and freshwater ecology. Its mission is to develop a scientific basis for EPA to create environmental policies concerning the use of freshwater resources. To accomplish this, ERL-D conducts the research, development, and technical assistance programs described below.

Researchers are studying complex effluents and are developing cost-effective methods for managing their toxicity in wastewaters. An ongoing project is the development of numerical water quality criteria for industrial chemicals to protect aquatic life and its uses. ERL-D scientists also develop sediment criteria for chemicals which pose long-term contamination problems and describe the fate and effects of pollutants in waters of the Great Lakes.

Pesticide scientists conduct research with both biological and chemical insecticides. The biological agent research is developing tests that will assess the virulence, survival and distribution of these unique forms in natural and laboratory systems. Field studies are conducted to verify earlier results from laboratory studies. Methods developed in both

research areas are being incorporated into the Federal pesticide registration process.

Toxic substances research specializes in developing methodology for conducting aquatic toxicity tests and in predictive aquatic toxicology. The data base produced is being modeled using computers so that predictions of toxicity can be made from physical/chemical properties and chemical structure. Scientists are also developing procedures to define the mode of toxic action and understand the metabolism of chemicals. Studies to determine the ecological significance and adequacy of existing laboratory-derived toxicity testing methods for protecting aquatic life are being conducted.

Other researchers are investigating a series of industrial chemicals to determine how fish absorb, distribute, metabolize, and excrete chemicals. ERL-D is participating in a national study that determines the levels of dioxin in fish, water, and sediment samples from across the country. In addition to analyzing field samples, ERL-D is conducting laboratory studies on the bioavailability of dioxin.

Environmental Research Laboratory – Duluth

FY88 Products

"Toxicokinetics and Toxicodynamics of Pyrethroid Insecticides in Fish"

"Toxicity of Chlorpyrifos, Endrin, or Fenvalerate to Fathead Minnows Following Episodic or Continuous Exposure"

"Environmental Contamination by Polychlorinated Dibenzo-p-dioxins and Dibenzofurans Associated with Pulp and Paper Mill Discharge"

"Response of an Alaskan Wetland to Nutrient Enrichment"

"Structure-Toxicity Relationships for Industrial Chemicals Causing Type (II) Narcosis Syndrome"

"Fish Population Changes and Mechanisms Associated with Changes in an Acidified Lake"

The Impact of Chlorine/Ammonia on Ecosystem Structure and Function in Experimental Streams

Survival and Effects of Bacillus thuringiensis var. israelensis Introduced into Aquatic Microcosm Communities

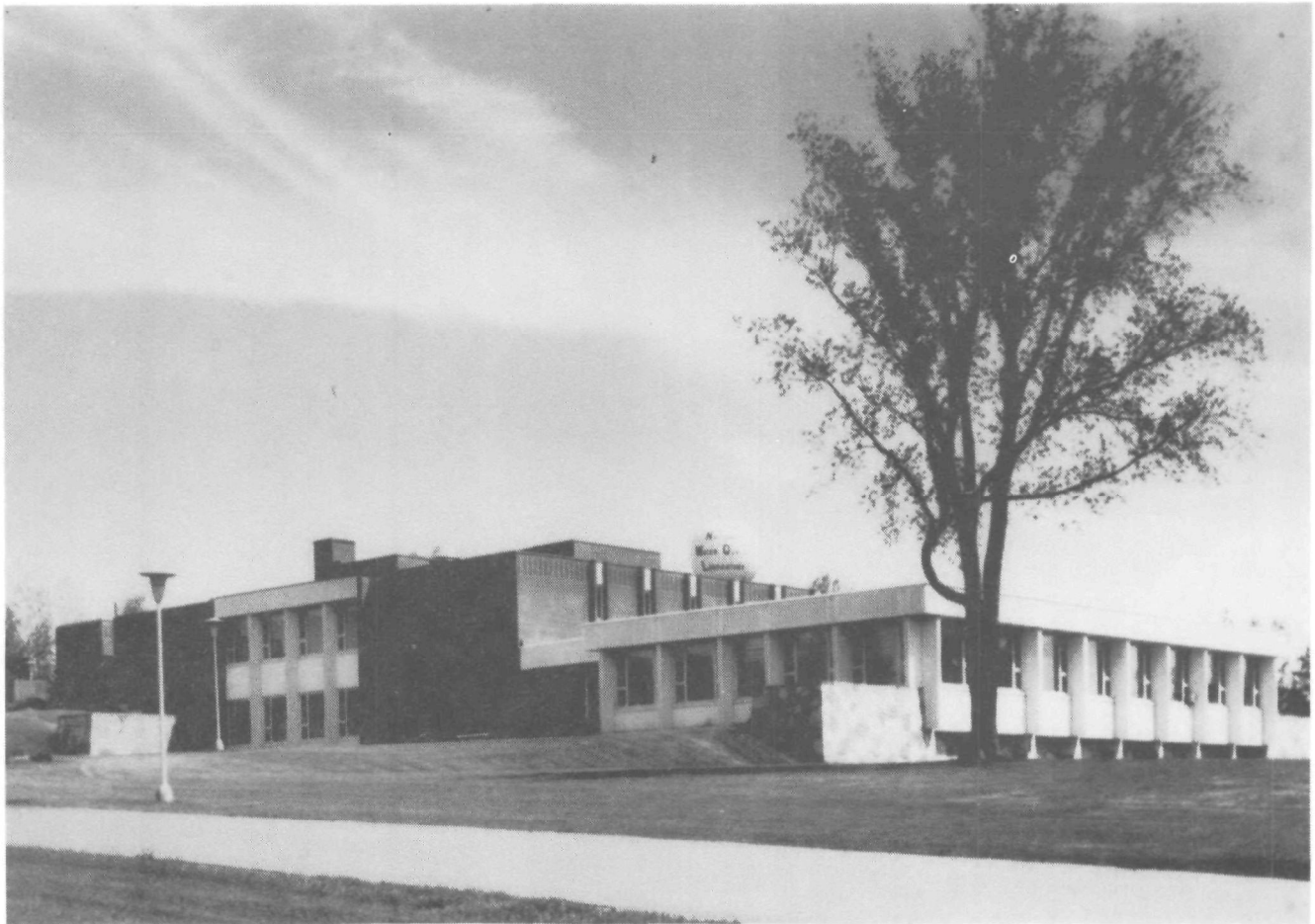
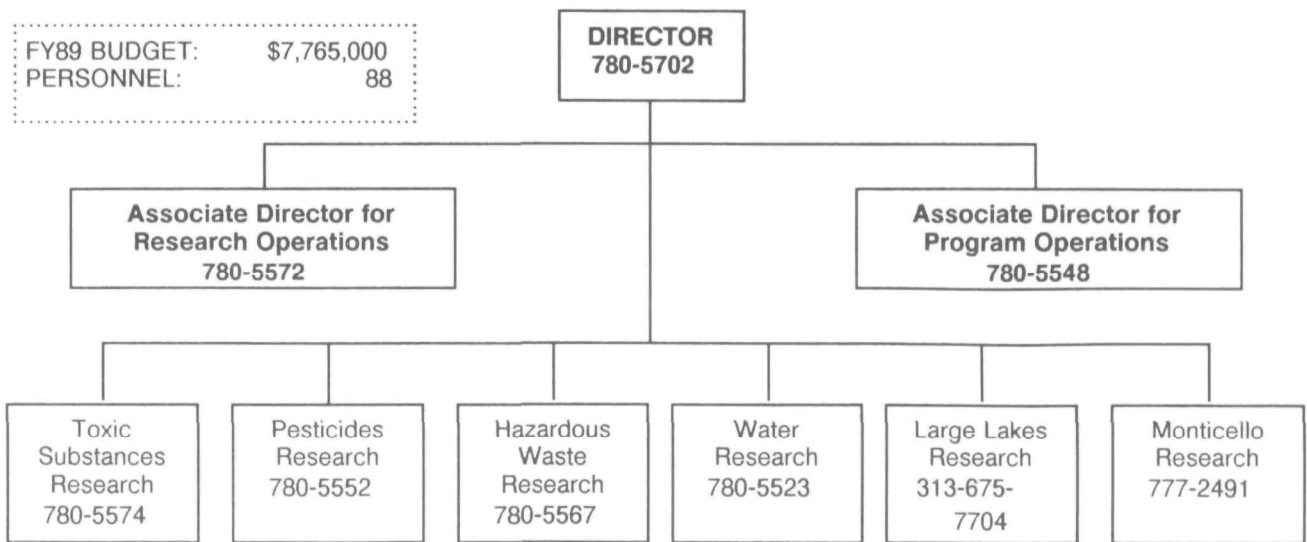
Development of Ecosystem Resiliency Data Base Factors Controlling Recovery of Aquatic Systems from Disturbance

Methods for Aquatic Toxicity Identification Evaluations: Phase I. Toxicity Characterization Procedures

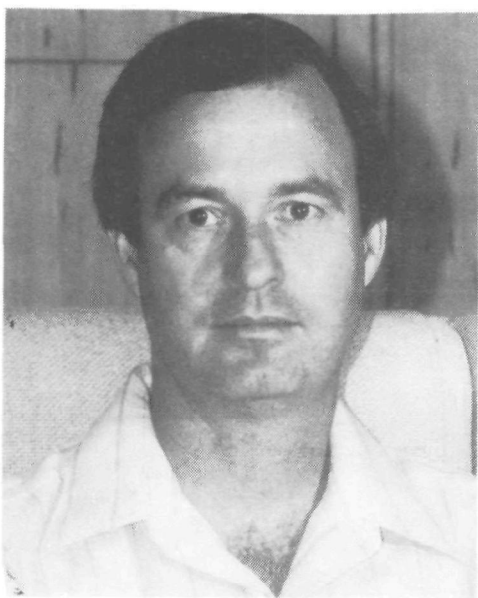
Most Important Publication

Enclosures for Aquatic Field Testing of Pesticides: The Effects of Chlorpyrifos on a Natural System

Environmental Research Laboratory – Duluth



Environmental Research Laboratory - Gulf Breeze



Raymond Gene Wilhour was named Acting Director of the Environmental Research Laboratory at Gulf Breeze in April 1988. Before this appointment he had served as Acting Deputy Director at ERL-Gulf Breeze since August 1987. Dr. Wilhour has served as scientist and team leader at EPA laboratories in Research Triangle Park, NC, and Corvallis, OR. As Chief of the Air Branch, he was responsible for EPA research on effects of air pollutants, acidic deposition, and UV-B radiation on agriculture, forests, and fresh waters. Dr. Wilhour received his BS and MS degrees in Forest Management and his Ph.D. in Plant Pathology from Pennsylvania State University.

Functions

The Environmental Research Laboratory at Gulf Breeze develops and analyzes scientific data on the impact of hazardous materials released in marine and estuarine environments. Scientific investigations primarily involve chemical compounds and biological products regulated by EPA's Office of Pesticides and Toxic Substances, the Office of Water Programs, and the Office of Solid Waste and Emergency Response.

Laboratory scientists develop and evaluate test systems to (1) evaluate and define mechanisms that affect biodegradation and accumulation of toxicants in aquatic food webs; (2) define procedures and evaluate protocols for biological treatment of hazardous wastes; (3) determine effects of carcinogens, mutagens, and teratogens in aquatic species; (4) develop principles and applications of ecotoxicology, including measurement and prediction of fate and effect of chemicals and synthetics on estuarine species and environments. Methods also are under development to apply laboratory observations to field situations and to evaluate potential risks from the release of biotechnological products in the marine environment.

Information from laboratory research is used to establish guidelines, standards, and strategies for management of hazardous materials in the near-coastal marine environment, to define and predict its ecological health, and describe cause(s) of

aberrant conditions or changes in its ecological status.

FY88 Products

"Adaptation of Aquatic Microbial Communities to Pollutant Stress," *Microbiol. Sci.*

"Constructing Microbial Strains for Degradation of Halogenated Aromatic Hydrocarbons," *Environmental Biotechnology: Reducing Risks from Environmental Chemicals Through Biotechnology*

"Comparison of the Seagrass *Thalassia testudinum* and Its Epiphytes in the Field and in Laboratory Test Systems," *Environ. Exp. Bot.*

"Inclusion Body Viruses. II. Baculoviruses of Invertebrates Other Than Insects," *Atlas of Invertebrate Viruses*

"Biological Containment of Genetically Engineered Microorganisms," *Classical and Molecular Methods to Assess Environmental Applications of Microorganisms*

"Tumors of the Cardiovascular System" *Natl. Cancer Inst. Monogr.*

Environmental Research Laboratory - Gulf Breeze

"Field Sampling in Estuaries: The Relationship of Scale to Variability," *Estuaries*

"Alterations in Growth, Reproduction, and Energy Metabolism of Estuarine Crustaceans as Indicators of Pollutant Stress," *IUBS Methods Manual. International Union of Biological Sciences*

"Potential for Transfer and Establishment of Engineered Genetic Sequences," *Trends Ecol. & Evol.*

Effects of Physico-Chemical and Biological Factors on Genetic Exchange in Aquatic Environments

"Trichloroethylene Metabolism by Microorganisms That Degrade Aromatic Compounds," *Appl. Environ. Microbiol.*

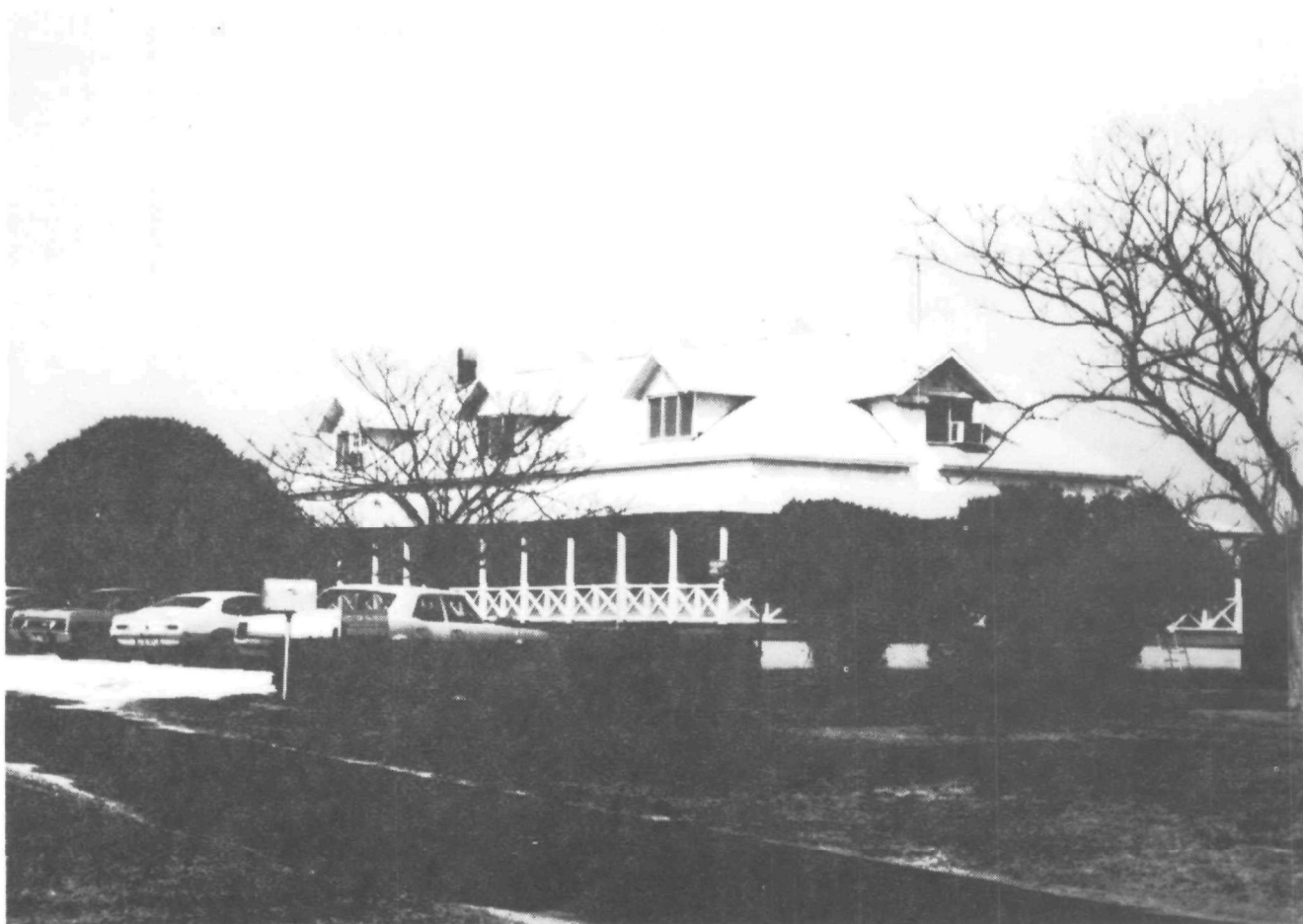
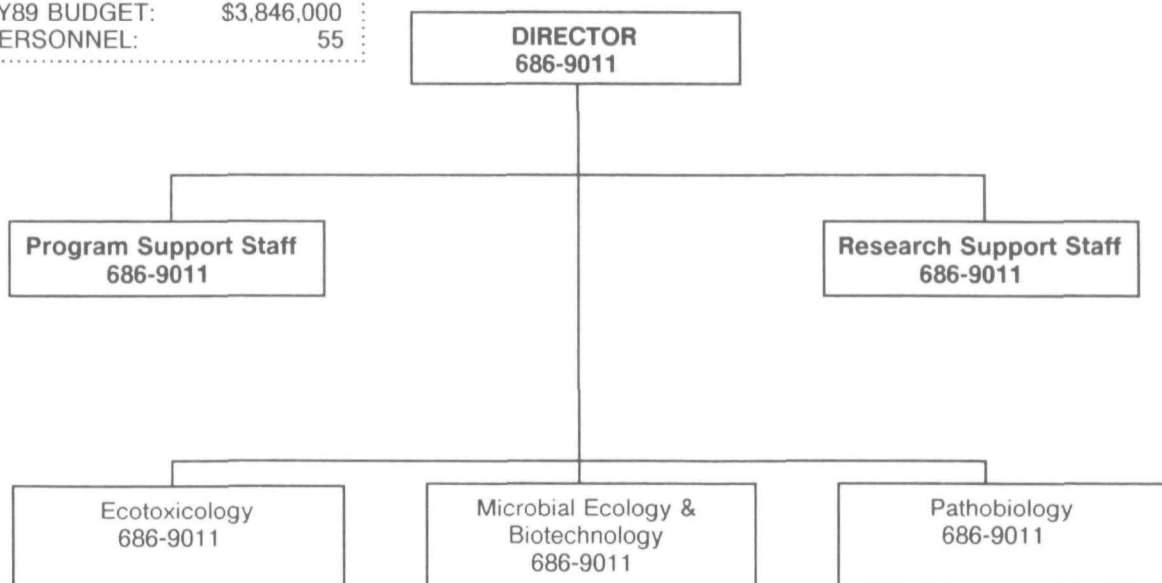
Acute Toxicity of Two Generic Drilling Fluids and Six Additives, Alone and Combined, to Mysids (Mysidopsis bahia) .

Most Important Publication

Detection of RNA Sequences to Characterize Natural Microbial Populations

Environmental Research Laboratory - Gulf Breeze

FY89 BUDGET: \$3,846,000
PERSONNEL: 55



Environmental Research Laboratory - Narragansett



Norbert A. Jaworski has been the Director of the Environmental Research Laboratory in Narragansett, Rhode Island, since 1986. From 1970 to 1985, he was the director of several Agency research laboratories, including Corvallis, OR; Research Triangle Park, North Carolina; and Duluth, Minnesota. Before joining the Agency, he was a deputy director in the Department of Interior. He received a Ph.D. degree in Water Resources Management from the University of Michigan and bachelor's and master's degrees in Civil Engineering from the University of Wisconsin (Madison). He has written over 50 publications and technical reports. He has received an EPA Gold Medal and the Presidential Rank of Meritorious Executive.

Functions

The Environmental Research Laboratory at Narragansett, Rhode Island, along with its Pacific Coast laboratory in Newport, Oregon, is the Agency's National Marine Environmental Quality Research Laboratory. The Laboratory's research supports primarily the EPA Office of Water, Office of Emergency and Remedial Response, and the Office of Air and Radiation. The Laboratory's efforts respond to legislative requirements of the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, and the Superfund Reauthorization Act. Major emphasis is placed on providing the scientific base for environmental criteria, waste disposal practices, environmental analysis/ impacts, assessments, and marine and estuarine risk assessments for regulatory activities of responsible offices.

The Laboratory's principal themes are: Environmental Chemistry, Transport and Fate, Biological and Ecological Effects, Biomonitoring, Ecological Risk Assessment, and Multidisciplinary Information Management.

The Laboratory is responsible for the following research program areas: (1) marine and estuarine disposal, discharge of (and recovery from) complex wastes, dredged material, and other wastes; (2) water use designation and derivation of criteria for marine and estuarine water and sediment;

(3) environmental assessment of ocean disposal and discharges of waste and wastewaters; (4) technical and research support for evaluating remediation options at proposed and designated marine/estuarine superfund sites; and (5) research on the effects of global warming and the depletion of stratospheric ozone on marine systems. Technical assistance, technology transfer, and investigations of an emergency nature, e.g., spills of toxic materials, also are provided to aid EPA offices in evaluating environmental threats posed by toxicants, other pollutants, and physical modifications along the Mid- and North Atlantic Coast, the West Coast, and other geographic locations. Technical assistance is also provided to other federal agencies, states, municipalities, and industry.

FY88 Products

"Biological Effects, Bioaccumulation, and Ecotoxicology of Sediment Associated Chemicals"

"Efficiency of Uptake of Hexachlorobenzene from Water by the Tellinid Clam, *Macoma nasuta*," *Aquatic Toxicology*

"Hypoxia-Induced Respiratory Changes in English Sole (*Parophrys vetulus* Girard)," *Comp. Biochemistry and Physiology*

Environmental Research Laboratory - Narragansett

"Four Independent Approaches to Developing Sediment Quality Criteria Yield Similar Values for Model Contaminants," *Environmental Toxicology and Chemistry*

"A Hazard Assessment Research Strategy for Ocean Disposal," *Oceanic Processes in Marine Pollution, Volume 3*, Ocean Waste Management Policy and Strategies

Guidelines for Deriving Ambient Aquatic Life Advisory Concentrations

Ambient Aquatic Life Water Quality Advisories for Tributyltin, *Saltwater Coordinator*

"Use of Bioassays in Determining the Toxicity of Sediment to Benthic Organisms," *Advances in Environmental Sciences and Technology*

"The Acute and Chronic Toxicity of Ammonia to Marine Fish and a Mysid," *Environmental Contamination and Toxicology*

"Ambient Aquatic Life Water Quality Criteria for Ammonia (Saltwater)," *Saltwater Coordinator*

"The Acute Toxicity of Sewage Sludge to Marine Fish, Mysids, and Copepods. in Oceanic Processes," *Marine Pollution; Urban Wastes in Coastal Marine Environments*

"Responses of Polychaetes to Cadmium Contaminated Sediment: Comparison of Uptake and Behavior," *Environmental Toxicology and Chemistry*

"Case Study of a Marine Discharge: Comparison of Effluent and Receiving Water Toxicity," *Aquatic Toxicology and Hazard Assessment*

"Selected Chemical Contaminants in Surface Sediments of Commencement Bay and the Tacoma Waterways, Washington, USA," *Marine Environmental Research*

"Toxicological Methods for Determining the Effects of Contaminated Sediment on Marine Organisms"

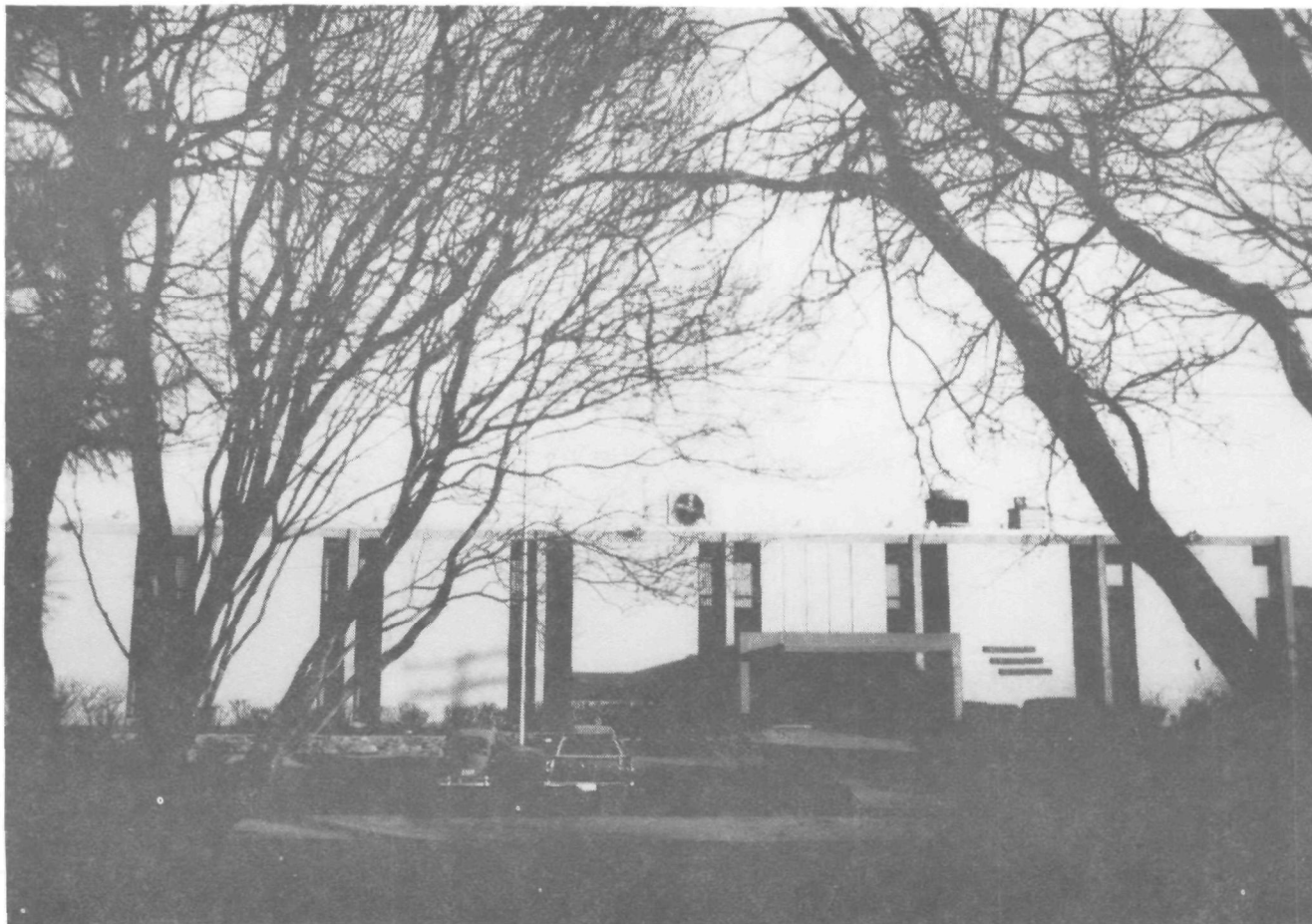
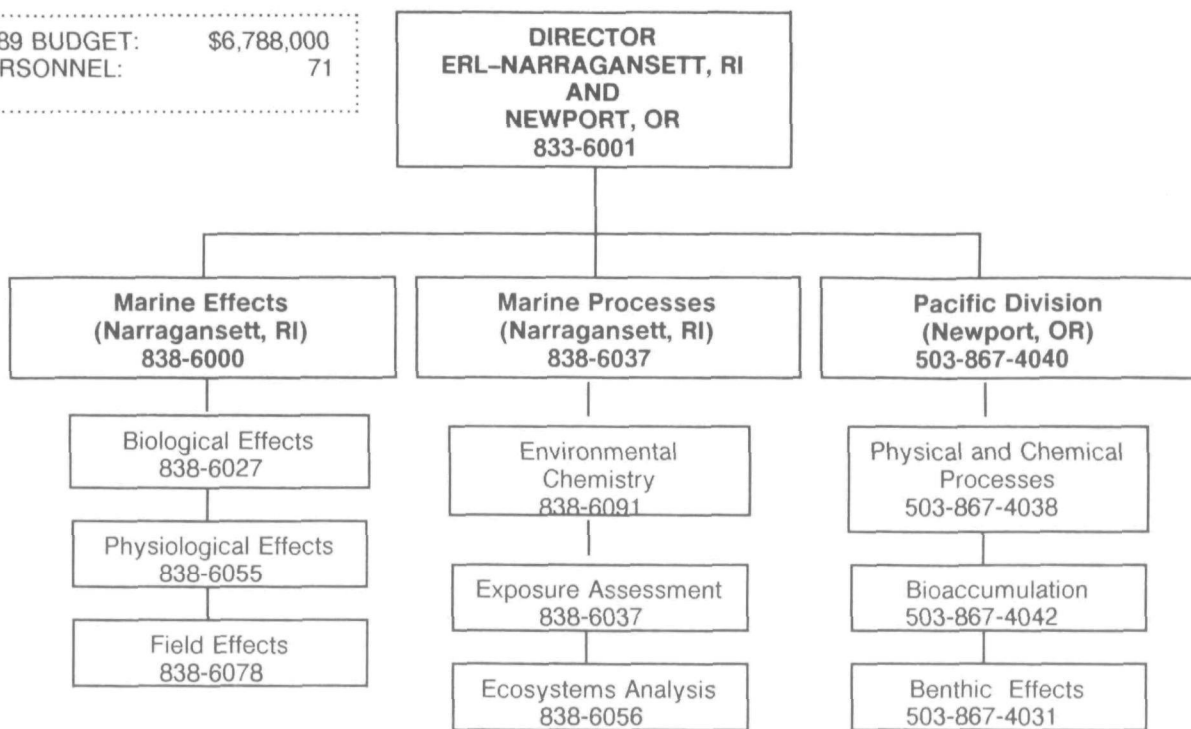
Report on the Assessment and Application of Pollutant Biomagnification in Near Coastal Waters

Most Important Publication

Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms

Environmental Research Laboratory - Narragansett

FY89 BUDGET: \$6,788,000
PERSONNEL: 71

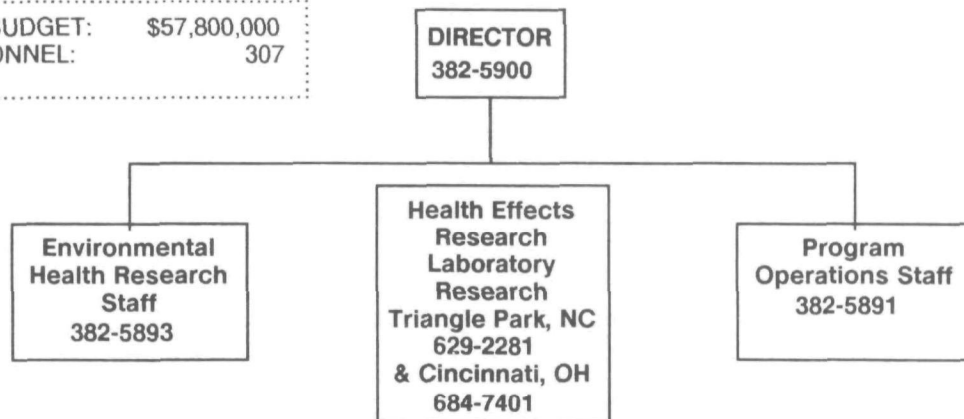


Office of Health Research



Ken Sexton received a bachelor's degree from the U.S. Air Force Academy and a master's degree in both Environmental Engineering and Sociology from Washington State University and Texas Tech University, respectively. His Ph.D. in Environmental Health Sciences is from Harvard University. From 1983 to 1985, Dr. Sexton was Director of the Indoor Air Quality Program for the State of California, and from 1985 to 1987, he was Director of Scientific Review at the Health Effects Institute in Boston, MA. He has published extensively in the scientific literature on human exposures to air pollution.

FY89 BUDGET: \$57,800,000
PERSONNEL: 307



Office of Health Research

Functions

The Office of Health Research (OHR) is responsible for planning, implementing, and evaluating a comprehensive, integrated human health research program. This program:

- documents adverse effects to man from environmental exposure to pollutants which ORD uses to support the Agency's regulating activities;
- develops test systems, methods, and protocols;
- conducts laboratory and field research studies;
- develops interagency programs which effectively use pollutants;
- offers technical assistance to the Regions and program offices;
- develops health science policy for the Agency; and
- provides a focal point for the effects of human exposure to environmental pollutants.

The Program Operations Staff:

- administers the ORD planning, reporting and review system;
- develops management systems necessary to support programs, personnel and budgets of the office and associated laboratories;
- reviews plans, progress, and resources for compliance with ORD, Agency and legislative requirements; and
- recommends planning and programming activities of the office to the Office of Administration and Resources Management and the Office of Policy, Planning and Evaluation.

The Environmental Health Research Staff:

- plans, manages, and evaluates research programs dealing with health impacts of exposures to criteria and non-criteria air pollutants, emissions from mobile sources, drinking water, and ambient water pollutants, solid and hazardous wastes and toxic chemical

substances (including pesticides) and Superfund;

- develops health research policy, priorities and program plans;
- determines resource allocations to carry out the health research program;
- provides program implementation guidelines to the Health Effects Research Laboratory;
- assures effective integration of all laboratory health research activities; and
- reviews laboratory management practices and research activities to determine progress toward program objectives.
- provides health research information and advice to steering committees, regulation review committees, interagency committees, and domestic and international organizations which request such assistance.

Program Activities

The Office of Health Research (OHR) supports a research program that has three main goals: 1) Develop, improve and validate toxicological test methods for use by the Agency's programs, 2) Produce dose-response data that will allow the Agency to perform the necessary risk assessments, and 3) Conduct a research program to improve the Agency's ability to assess health risks from environmental exposures. These three goals serve as the core around which each of the media specific programs are planned and implemented. Below is a brief description of the health issues which are being addressed in OHR's research program.

Air

- In the air health research program major efforts are being directed at providing dose-response data for use in risk of the six criteria pollutants. This research is being conducted using animal toxicology studies and both human clinical and epidemiological studies and both human clinical and epidemiological studies and develops data describing the effects of exposure to these pollutants on pulmonary function, changes in host defense functions (immunotoxicity), cardiovascular disease, and neurological function. Research is also developing better methods to determine the deposition of pollutants in the lung in order to

improve our risk assessment capabilities. Research on hazardous air pollutants is focused on determining the potential mutagenic and carcinogenic hazard of VOC's and mixtures of air pollutants. The indoor air health effects research program is focusing on developing methodology and data to evaluate the effects, both cancer and non-cancer, from exposure to combustion emissions from kerosene heaters, wood stoves, environmental tobacco smoke, and other sources of indoor air pollution.

Water

- The drinking water health effects research program primary programmatic focus is to determine the health effects from the use of various drinking water disinfectants (chlorine, chloramine, ozone). Human clinical and epidemiology studies are being planned and conducted to determine the relationship between water disinfection and both cancer and cardiovascular disease. A major effort to develop in vitro and in vivo test methods for use in screening concentrated drinking water samples and complex mixtures for potential health effects is underway. These methods are used to identify and isolate the biologically active components or chemicals from drinking water concentrates for further in depth health characterization. Dose-response studies are also being conducted on specific drinking water disinfection by-products to support the development of drinking water standards.

Pesticides and Toxics

- The pesticides and toxic substances research program focuses on developing test methods for determining the health effects from pesticides and commercial chemicals, developing both animal and human biomarkers to improve our understanding of exposure-dose relationships and to apply these methods in biochemical epidemiology studies, research to determine the potential health effects from microbial pesticides and genetically engineered organisms and research to develop structure activity relationship models to support TSCA section 5.

Hazardous Waste/Superfund

- The major programmatic issue being addressed in the hazardous waste health research program is to develop a test methodology for comparing the potential cancer and non-cancer health risks

from hazardous waste incineration and municipal waste combustion.

Finally, the health effects Superfund research program is conducting research to develop test methods to screen and evaluate the potential health hazard from exposure to waste mixtures.

Issues

Relationship Among EPA, NIEHS, and ATSDR in Superfund Health Research

The Superfund Amendments and Reauthorization Act of 1986 addressed the issue of support to Superfund in the area of health effects assessment by authorizing a broad based Federal program of research. The operating environment created by this broad mandate is complex, having many participants and many interrelated activities. Major participants include EPA/ORD (both OHR and OHEA), EPA/OSWER (OERR, OWPE, and many contractors), NIEHS, and ATSDR.

Requirements for health related activities derive from the Act and are further provided for and clarified in the National Contingency Plan for Oil and Hazardous Materials Release (NCP), the Remedial Investigation/Feasibility Study guidance document, the Superfund Public Health Evaluation Manual, and the ATSDR Health Assessment guidance manual. NIEHS is required to establish a university-based basic research program. ATSDR is to prepare qualitative Health Assessments and Toxicological Profiles on the most hazardous substances found at Superfund sites, perform various health/epidemiologic studies on exposed populations, establish exposure and disease registries of certain at-risk populations, and implement a research program for each Toxicological Profile chemical. EPA is responsible for establishing a quantitative program for detecting, assessing, and evaluating the effects on and risk to human health of hazardous substances.

There exists a wide lack of understanding of how health information is brought into and made a part of the Superfund site decision-making process, what the various steps are, what products are used in the process, who prepares the individual products and the impact of each product on the decision-making process.

Efforts will be needed to coordinate the programs and the exchange of information that results from them. We need to show that each of the participants fills a niche not filled by others and that the research results from each of the programs are generally useful to the others.

Development of effective interactions with the Health Effects Institute (HEI) for both mobile source and asbestos issues

The HEI is a non-profit organization founded in 1980 to assure that credible, objective, and high-quality scientific studies are carried out on the potential health effects of motor vehicle emissions. EPA's Office of Research and Development contributes \$3 million per year to HEI, which is matched by \$3 million from the automotive industry. Although both sponsors make recommendations about relevant research needs, HEI makes an independent decision about appropriate research to address key questions. HEI makes no recommendations on regulatory or social policy.

In the FY 1989 Report of the House Appropriations Committee, EPA is directed to give HEI \$2 million, to be matched on at least 50-50 basis by contributions from private sources, for the study of asbestos exposures and their significance in buildings. HEI was directed to submit a plan on the organization, staffing, and peer review structures, the research work plan, and financial commitments before any funds are obligated for research.

The challenge for EPA is to evaluate the HEI experiment in regard to research on the health effects of automotive emissions and determine what changes, if any, are needed to improve the effectiveness of the current arrangement, and work with HEI and the private sector to construct an appropriate research program that addresses the important issues associated with asbestos exposure in buildings.

Decision about the productive use of the Task Force on Environmental Cancer and Heart and Lung Disease

The Clean Air Act Amendments of 1977 established the Task Force and charged it with promoting cooperation and coordination among Federal agencies concerning environmental health issues, including research. The EPA Administrator is Chairman of the Task Force, while the Director of EPA's Office of Health Research is the Working

Group Chairman. The Task Force meets at the discretion of the Administrator, while the Working Group meets quarterly. In accordance with the provisions of the law, the Task Force submits an annual report to Congress on research recommendations.

The EPA should decide how the Task Force can best be used to promote interagency coordination on important environmental health issues. Specifically, a review of Task Force activities should be undertaken with an eye toward deciding 1) whether to recommend continuation, and 2) given an affirmative response, how to go about maximizing the effectiveness of the Task Force.

Health Effects Research Laboratory



Functions

The Health Effects Research Laboratory (HERL) is one of the 12 Office of Research and Development (ORD) laboratories within EPA.

HERL provides the health data base which serves as the foundation for the health-related regulatory decisions of the Agency. In building this foundation, evidence is gathered, not only from internal research studies, but also from cooperative agreements and contracts with universities and private institutions, and through agreements with other governmental agencies.

Wide ranges of pollutants known or suspected to cause health problems are studied. The research focuses on air pollutants including indoor air and mobile source pollutants, water pollutants, toxic substances, pesticides, and hazardous wastes.

The major mission of HERL is to provide hazard assessment-related research in support of risk assessment. To achieve this in a fashion compatible with the water, solid waste, air and radiation, and pesticides and toxic substances program offices requires major research emphasis on hazard identification, dose-response studies, extrapolation, and dosimetry. In most instances, providing the necessary responsiveness to the Program Offices requires HERL to make major advancements in the

Lawrence W. Reiter has been the Director of the Health Effects Research Laboratory since April 1988. Prior to being named Director of the Laboratory, Dr. Reiter was Director of HERL's Neurotoxicology Division. Earlier in his career, he was responsible for centralizing the neurotoxicology research program for the Agency and received an EPA Bronze Medal in 1979 for his role in this effort. Additional awards Dr. Reiter has received include two Special Achievement Awards and the Agency's Scientific and Technological Achievement Award. Dr. Reiter serves on the editorial board of three professional journals and is an internationally recognized neurotoxicologist who has been involved in a variety of activities to define and implement national priorities for environmental health research in this area. He earned his Ph.D. in neuropharmacology from the University of Kansas Medical Center in Kansas City. Before joining EPA in 1973 as a research pharmacologist, he was post-doctoral fellow and lecturer in environmental toxicology at the University of California-Davis.

state-of-the-art, especially for model development and extrapolation. The diversity of the needs of EPA has resulted in the development of a broad-based HERL program with multiple high priorities. This has led to HERL's unique capability to conduct research using oral, dermal, and inhalation routes of exposure; in vitro, animal toxicology, human clinical, and epidemiological approaches; and a full range of toxicological disciplines including neurotoxicology, reproductive toxicology, teratology and perinatal toxicology, geriatric toxicology, pulmonary toxicology, immunotoxicology, cardiovascular toxicology, genotoxicology, hepatotoxicology, other target organ toxicology, dosimetry, and microbiology.

Organizationally, HERL consists of six research divisions. While most of the research facilities are located in the Research Triangle Park, North Carolina, HERL has one division, the Toxicology and Microbiology Division, located in Cincinnati, Ohio. Also HERL has one of the nation's few sophisticated human inhalation exposure facilities which is located on the campus of the University of North Carolina at Chapel Hill.

Health Effects Research Laboratory

FY88 Products

"Effects of Inhalation of 0.25 PPM Ozone on the Terminal Bronchioles of Juvenile and Adult Rats," *Experimental Lung Research*

"An A2-Adrenergic Mode of Action of Chlordimeform on Rat Visual Function," *Toxicology and Applied Pharmacology*

"Developmental Effects of Maternal Stress in the CD-1 Mouse Induced by Restraint on Single Days During the Period of Major Organogenesis," *Toxicology*

"Prenatal Dinocap Exposure Alters the Swimming Behavior of Mice Due to Agenesis of Otoliths in the Inner Ear," *Toxicology and Applied Pharmacology*

"Studies on the Potent Bacterial Mutagen 3-Chloro-4-(Dichloro-methyl)-5-Hydroxy-2(5-H)-Furanone: Aqueous Stability, XAD Recovery and Analytical Determination in Drinking Water and in Chlorinated Humic Acid Solutions," *Mutation Research*

"Chemical Reactivity, Cytotoxicity, and Mutagenicity of Chloro-propanones," *Toxicology and Applied Pharmacology*

"Genotoxicity of Acrylic Acid, Methyl Acrylate, Ethyl Acrylate, Methyl Methacrylate, and Ethyl Methacrylate in L5178Y Mouse Lymphoma Cells," *Environmental and Molecular Mutagenesis*

"Comparison of Chlordimeform and Carbaryl Using a Functional Observational Batter" *Fundamental and Applied Toxicology*

"A Case-SAR Study of Mammalian Hepatic Azoreduction," *Journal of Toxicology and Environmental Health*

"Acute Exposure of the Neonatal Rat to Triethyltin Results in Persistent Changes in Neurotypic and Gliotypic Proteins," *Journal of Pharmacology and Experimental Therapeutics*

"Effects of Ambient Ozone on Respiratory Function in Active Normal Children," *American Review of Respiratory Disease*

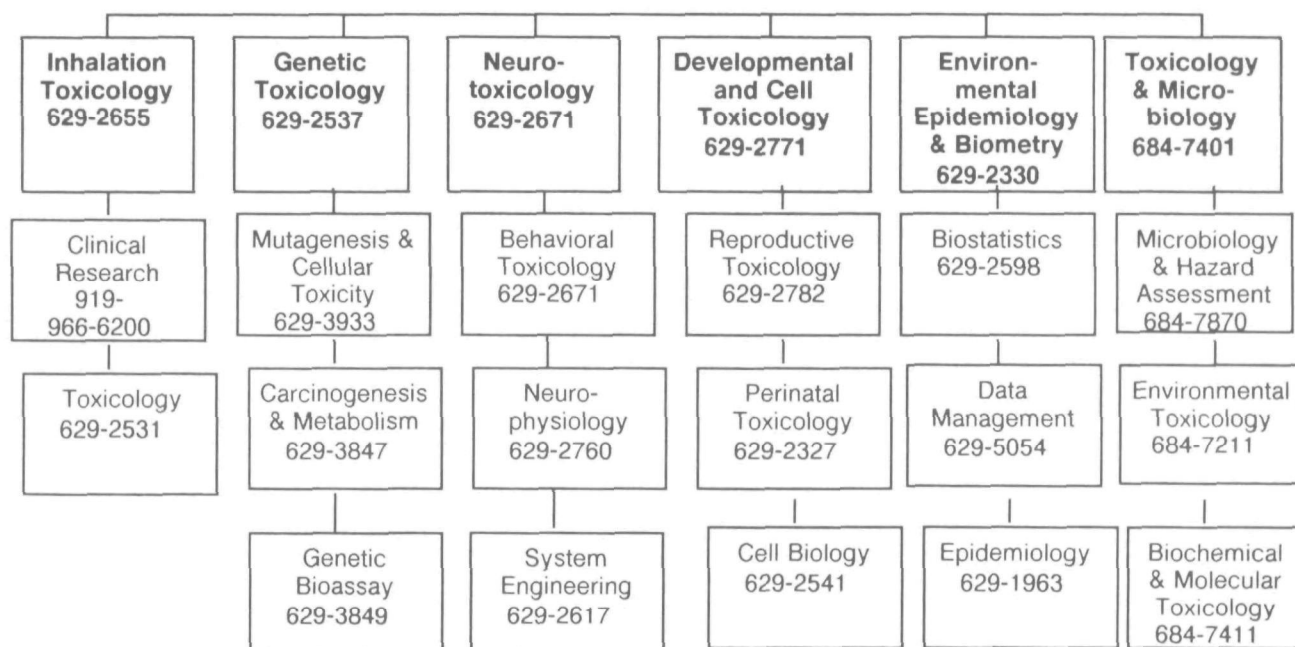
Most Important Publication

"Pulmonary Function and Symptom Responses After 6.6 Hour Exposure to 0.12 PPM Ozone with Moderate Exercise," *Journal of the Air Pollution Control Association*

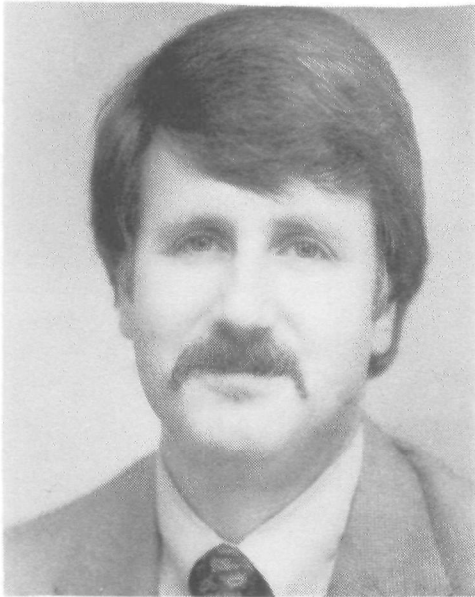
Health Effects Research Laboratory

FY89 BUDGET: \$46,224,000
PERSONNEL: 286

DIRECTOR
HERL-RTP & CINCINNATI
629-2281

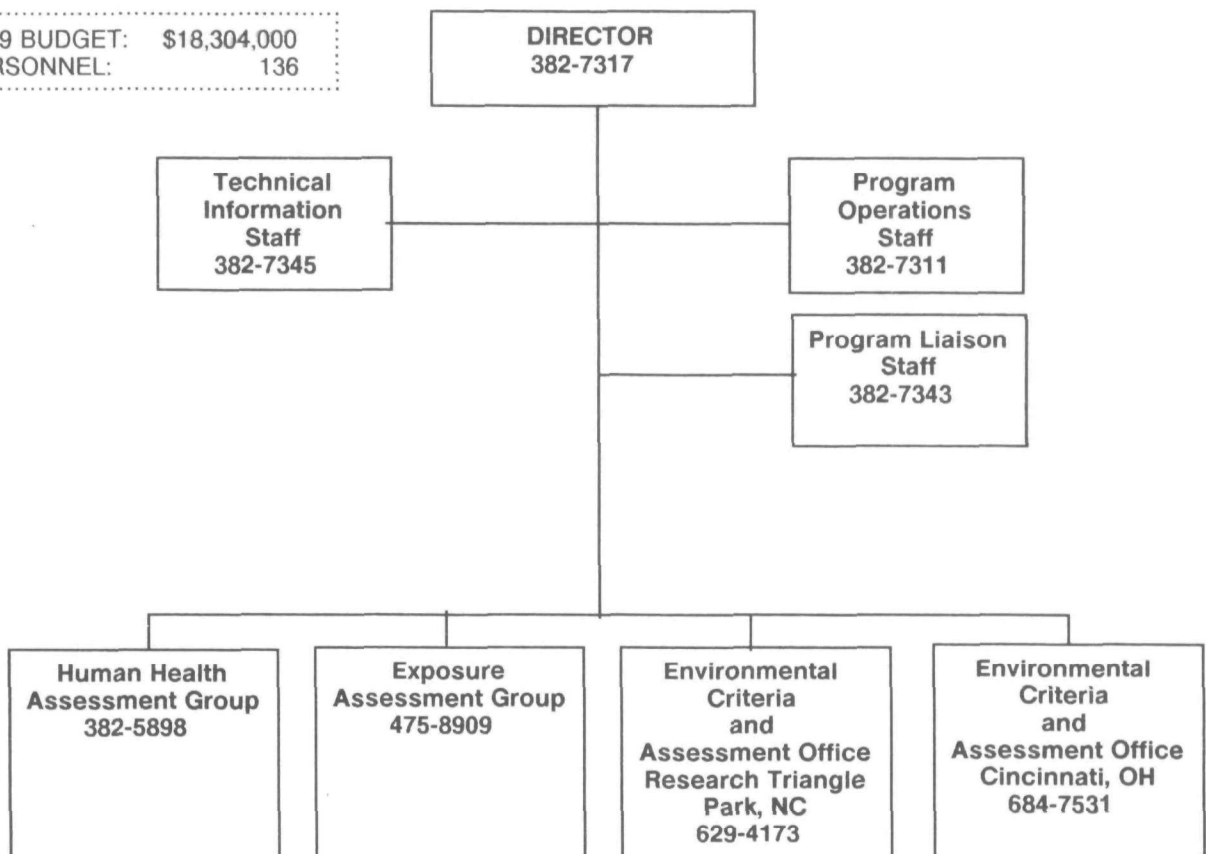


Office of Health and Environmental Assessment



William H. Farland is the Director of the Office of Health and Environmental Assessment. He has been with EPA since 1979, and served as Deputy Director, Health and Environmental Review Division, Office of Toxic Substances before joining ORD in 1986 as Director of the Carcinogen Assessment Group. He received a Ph.D. and master's degree from University of California, Los Angeles, and a bachelor's degree in biology from Loyola University. He was a National Cancer Institute Postdoctoral Fellow (National Research Service Awardee), at the University of California, Irvine, California, and Brookhaven National Laboratory, Upton, New York.

FY89 BUDGET: \$18,304,000
PERSONNEL: 136



Office of Health and Environmental Assessment

Functions

The Office of Health and Environmental Assessment (OHEA) is the focal point within the Environmental Protection Agency for the scientific assessment of the degree of risks imposed by environmental pollutants in varying exposure situations on human health and ecological systems. OHEA occupies a critical location in the Office of Research and Development (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. In support of its mission to provide the Agency with the best possible scientific assessments of risk to human health and the environment, OHEA carries out three functions:

- Preparing human health risk assessments to meet specific information needs of the EPA regulatory program offices. The risk assessments performed by OHEA serve as the scientific basis for regulatory and enforcement decisions.
- Helping promote Agency-wide coordination and consistency of risk assessments through the preparation of guidelines; providing expert advice, reviews and data analysis; and participation in the regulatory decision process.
- Planning and conducting research leading to the reduction of uncertainties in risk assessment. As the primary client for the results of this research, OHEA cooperatively plans research projects which are carried out by other ORD organizations (e.g., Health Effects Research Laboratory) as well as its own selected extramural projects.
- Providing information on Reference Doses (RfDs) or Agency agreed-upon Risk Estimates of Carcinogenicity (RECs) through the Integrated Risk Information System (IRIS).

In addition, OHEA is "home" to the Risk Assessment Forum.

Program Activities

Air

- Evaluate research findings concerning the health effects of hazardous air pollutants emitted from restricted stationary sources or their transformation products, as well as

background information on physical and chemical properties, sources, emissions, transport and transformation, and ambient concentrations. Such assessments also evaluate chemical compositions of fuel additives, diesel and gasoline exhausts, human exposure to motor vehicle pollutants, and evidence of resulting health effects.

- Review and revise criteria for setting National Ambient Air Quality Standards (NAAQS) for sulfur oxides, particulate matter, nitrogen oxides, ozone and other photochemical oxidants, carbon monoxide and lead.
- Develop an exposure assessment/risk characterization framework, updating and revising the Indoor Air Pollution Information Assessment and the Indoor Air Reference Data Base, determine the extent of population exposure to indoor air pollutants, and develop biological contaminant measurement methods.

Water

- Assess the health effects of exposure to contaminants in drinking water, specifically evaluating relevant scientific data describing the physical and chemical properties, the pharmacokinetics, the health effects in animals and humans, and the mechanisms of toxicity.
- Provide guidance for assessing the risk of human exposure to mixtures of toxic chemicals, and evaluate site-specific health hazards for ambient waters as required by the states and EPA.
- Provide risk assessment methodologies for chemicals and pathogens in support of regulatory decision making on the use and disposal of municipal sludge.

Hazardous Waste

- Reduce the uncertainties in dioxin risk assessments by analyzing soil ingestion patterns in children, and investigating the pharmacokinetics of 2,3,7,8-TCDD in rhesus monkeys as a model for pharmacokinetics in humans.
- Develop a comprehensive risk assessment methodology for municipal waste incineration to include the appropriate methods for assessing the risks resulting from the use of

municipal waste incineration as well as the risks remaining after the waste has been burned.

- Provide chemical-specific health and environmental effects documents to support RCRA 3001 listing decisions and support to the land disposal restriction program in the form of reference dose (formerly Acceptable Daily Intake) documentation.

Toxic Chemical Testing/Assessment

- Provide evaluations and assistance to the Office of Toxic Substances in the area of health risk assessments for cancer, mutagenicity, reproductive and developmental effects and exposure to support decision-making under TSCA (i.e., existing chemicals program, PMN review, and test guidelines and test rules development).
- Develop assessment methods for cancer/non-cancer effects in humans caused by exposure to environmental chemicals.

Pesticides

- Provide evaluations and assistance to the Office of Pesticide Programs in the area of health risk assessments for cancer, mutagenicity, reproductive and developmental effects and exposure.

Intermedia

- Provide uniform Agency-wide guidance on, and assures the consistency of, exposure and risk assessments that support regulatory decision-making by EPA through risk assessment guidelines, the Risk Assessment Forum, and the Integrated Risk Information System (IRIS).

Superfund

- Review and prepare site-, chemical- and situation-specific exposure and risk assessments to assist the program office and Regions in evaluating the alternative courses of action and regulatory strategies that might be applied at uncontrolled Superfund sites.
- Provide site- and chemical-specific health assessments to support enforcement office needs for the remedial planning and cost recovery efforts.

- Develop data and procedures to fill information and assessment gaps that exist in the various phases of the Superfund public health evaluation process, e.g., toxicity assessment, risk characterization, and exposure assessment.
- Provide chemical-specific data on carcinogenicity and chronic effects to support program office activities necessary to adjust, by regulation, the Reportable Quantities (RQ) for hazardous substances. These include completion of the original CERCLA hazardous substance list and the Extremely Hazardous Substances List, as well as listings in association with Section 3001 of RCRA support for designation of new substances, and review of old RQ calculations.

Issues

OHEA's role in the Agency has been evolving from an office that performs risk assessments to an office that is a major force in assuring the consistency and high scientific quality of risk and exposure assessments conducted in other parts of the Agency. This evolution will continue, and OHEA must find ways of successfully fulfilling these broader responsibilities.

Research/Risk Assessment

OHEA should continue its program, begun in 1987, to influence research efforts to reduce uncertainties in risk assessment. OHEA has the unique capability to provide direction, priority, and scientific expertise to such research, and must develop the means, working with other ORD offices, to incorporate the results of these research efforts into its ongoing agenda of risk assessment documents, its assessment guidelines, and the data bases used throughout the Agency. ORD is pursuing major research efforts in understanding ecological risk and in improving exposure assessment. Pharmacokinetics, model validation, and reducing the uncertainty in exposure assessment are areas of future research. As the only human health risk assessment group within ORD, OHEA is working to reduce uncertainty in risk assessments through the validation of assumptions about the species-to-species extrapolation, dose-rate effects, dose-response models, biomarkers, and gender equivalence and must continue to develop

Office of Health and Environmental Assessment

and evaluate new methods for improving carcinogen risk assessment.

OHEA is an important client for research conducted by the other ORD offices. OHEA needs to develop its effectiveness in helping to plan needed research to be conducted by other parts of ORD. The ultimate result of such enhanced planning will be research findings that are targeted to the needs of the risk assessors.

National Ambient Air Quality Standards (NAAQS)

The major scientific assessment issues associated with NAAQS are as follows:

Acid Aerosols are emerging as a major ambient air quality issue. In June 1988, the Science Advisory Board's Clean Air Scientific Advisory Committee (CASAC) recommended that the Agency consider listing acid aerosols as a criteria pollutant for NAAQS regulation. If such a listing decision is made, then the Clean Air Act requires criteria review and proposal of NAAQS within one year.

NAAQS review of Carbon Monoxide (CO) and Nitrogen Oxide (NO) will present additional major issues during the next several years. Preparation of revised criteria documents is underway. The major controversial issue is with CO. The CO issue to be resolved focuses on whether previously reported (but partially suspect) findings indicating cardiovascular effects at 2-3% carboxyhemoglobin (COHB) levels are substantiated by better-conducted, newer studies by (1) EPA/ORD Health Effects Research Laboratory (HERL); and (2) a Health Effects Institute (HEI) sponsored "three-center study" being cooperatively carried out by three major academic research groups.

Indoor Air

The assessment of the microenvironment, especially indoor air, is an emerging EPA activity. A key issue is the merging of ongoing indoor air research and assessments with traditional assessments of the ambient environment, i.e., assessing the risks of indoor exposures in relation to the outside environment. To date, exposure assessments for air pollution have not considered the fact that most people spend about 90% of their time indoors exposed to concentrations of "hazardous" air pollutants that are 3 to 10 times higher than those found in the ambient environment. OHEA expects to continue to play a key role in matrix management

coordination/integration of ORD indoor air research efforts during the foreseeable future. Work has begun to standardize the procedures for risk assessments of various indoor air pollution scenarios. This work and OHEA's approaches to assessing other environmental problems such as waste incinerators should be coordinated with the objective of arriving at consistent risk assessment approaches.

Toxicological Profiles

OHEA participates in a cooperative effort with the EPA Office of Toxic Substances (OTS) and the Agency for Toxic Substances and Disease Registry (ATSDR) to both develop and review Toxicological Profiles as mandated by the Superfund Amendments and Reauthorization Act (SARA). This mandate requires ATSDR to prepare profiles for each substance included on the first priority list of 100 chemicals, which both the U.S. Department of Health and Human Services (DHHS) and EPA determined posed the most significant potential threat to human health, found at facilities on the CERCLA National Priorities List. Beginning in 1989, profiles will be developed for the second list of 100 chemicals. This is a major emerging issue that is expected to continue for the next several years in that it is a resource-intensive activity competing with site-specific assessment issues and Superfund-related research.

New Directions

The issues here concern a change in the way OHEA does business, e.g., we are moving from an office preparing chemical-specific health assessments to an office developing new and improved risk assessment methodology, and providing review and oversight for consistency in risk assessment approaches and in EPA's risk assessment activities. As research needs are defined through risk assessment activities, OHEA must find better ways to alert the research community to these research needs.

Most Important Publication

Integrated Risk Information System Database. A Summary of Risk Assessment and Regulatory Information on Chemicals

Exposure Assessment Group



Michael A. Callahan has been the Director of the Exposure Assessment Group since 1986. His prior experience at EPA includes positions in the Office of Toxic Substances and the Office of Water. He began his career as a chemist with the U.S. Army Research and Development Center. He has been awarded three EPA Bronze Medals for Commendable Service. He received a master's degree in organic chemistry from George Washington University and a bachelor's degree in chemistry from Northwestern University.

Functions

The Exposure Assessment Group provides advice on the exposure characteristics and factors of agents that are suspected of causing detrimental health effects; provides state-of-the-art methodology, guidance, and procedures for exposure determinations; and prepares independent assessments of exposure and recommendations concerning the exposure potential of specific agents. The Exposure Assessment Group consists of the following two branches:

The Exposure Assessment Application Branch is responsible for performing exposure assessments, applying exposure assessment methods to site-specific cases, reviewing Regional Superfund risk assessments, and reviewing exposure assessments prepared by other organizations.

The Exposure Assessment Methods Branch is responsible for developing methods for use in exposure assessments, chairing Agency-wide work groups on subjects such as guidelines development and related Risk Assessment Forum topics, performing exposure assessments, and reviewing exposure assessments prepared by other organizations.

These branches provide state-of-the-art methodology, guidance, and procedures as well as plan and execute research in the area of exposure assessment.

FY88 Products

"Reference Physiological Parameters in Pharmacokinetic Modeling"

"Estimating Exposures to 2,3,7,8-TCDD"
(External Review Draft)

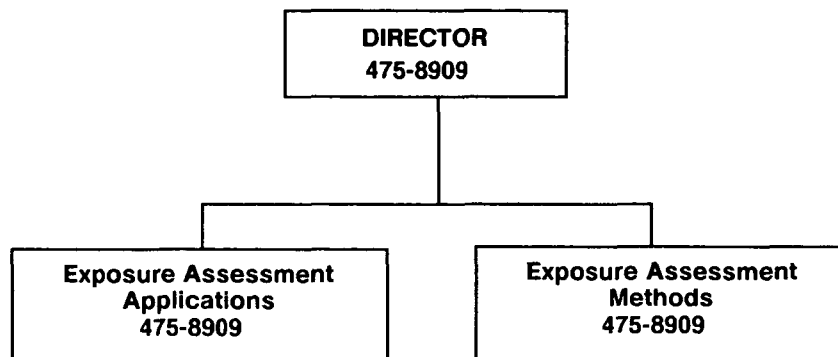
"Selection Criteria for Mathematical Models Used in Exposure Assessment - Surface Water Models"

"Selection Criteria for Mathematical Models Used in Exposure Assessments: Ground-Water Models"

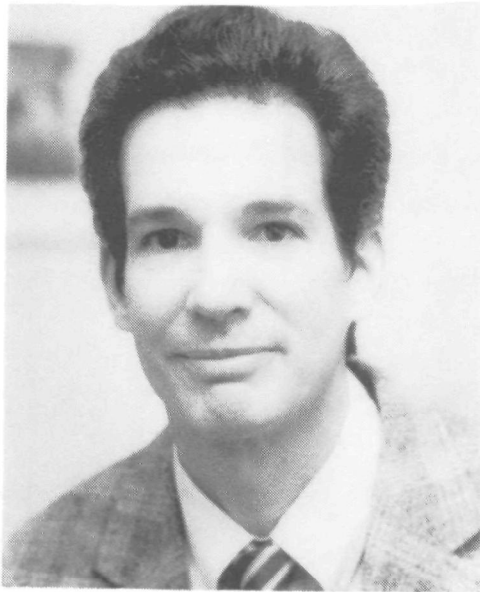
Most Important Publication

Selection Criteria for Mathematical Models Used in Exposure Assessments: Surface Water Models and Ground-Water Models

Exposure Assessment Group



Human Health Assessment Group



Charles H. Ris has been the Acting Director of the Human Health Assessment Group since September 1988. His prior experience in EPA was in the Office of Health and Environmental Assessment and the Office of Planning and Review. He began his career as a sanitary engineer with the U.S. Public Service, Water Supply Systems. He received two degrees from Georgia Tech: a bachelor's in Civil Engineering and a master's in Sanitary Engineering. He was awarded the EPA Silver Medal.

Functions

The Human Health Assessment Group provides advice on the health risks associated with suspected cancer-causing agents and the risks associated with chemicals that are suspected of causing detrimental reproductive effects, including mutagenic, teratogenic, and other adverse reproductive outcomes and reduced fertility. The Group is composed of four branches:

The Carcinogen Assessment Toxicology Branch is responsible for advising the Agency's operating programs on the health risks associated with suspected cancer-causing agents as interpreted from animal toxicology and pathology data.

The Carcinogen Statistics and Epidemiology Branch advises the Agency on the health risks associated with suspected cancer-causing agents as interpreted from epidemiology data and the statistical analysis of both epidemiologic and animal data.

The Reproductive and Developmental Toxicology Branch is responsible for advising the Agency on the health risks associated with suspected reproductive and developmental toxicants as interpreted from *in vitro*, experimental animal, and human data.

The Genetic Toxicology Assessment Branch advises the Agency on the health risks associated with suspected genotoxins as interpreted from *in vitro*, experimental animal, and human data.

These branches provide state-of-the-art methodology, guidance, and procedures for the evaluation of carcinogenic, mutagenic, reproductive, and developmental effects; assure quality and consistency in the Agency's scientific risk assessments; make recommendations on testing requirements (research) needed for adequate risk assessments; prepare independent assessments of risk and make recommendations concerning the nature and extent of health hazards associated with specific substances; and, plan and execute research in the areas of carcinogenicity, mutagenicity, and reproductive and developmental effects.

Human Health Assessment Group

FY88 Products

"Proposed Guidelines for the Assessment of Male Reproductive Risk," *Federal Register*

"Proposed Guidelines for the Assessment of Female Reproductive Risk," *Federal Register*

"Proceedings of the Workshop on One- vs. Two-Generation Reproductive Effects Studies," *J. Am. Coll. Toxicol*

"U.S. Environmental Protection Agency Guidelines for Mutagenicity Risk Assessment and Some Comments on Aneuploidy," *Aneuploidy, Part B: Induction and Test Systems*

Cancer assessments written or reviewed to meet regulatory needs of program offices.

Special report on inorganic arsenic
CERCLA Reportable Quantity Methodology
194 CERCLA Reportable Quantity Profiles
Lead carcinogenicity assessment
PCB Drinking Water Criteria Document
Styrene Drinking Water Criteria Document
Phthalic Acid Esters Health and Environmental Effects Profile (HEEP) and Health Effects Assessment (HEA)
Dieldrin Health Effects Assessment (HEA)
EDB Health Effects Assessment (HEA)
Lindane Drinking Water Criteria Document
Perchloroethylene Health Effects Assessment (HEA)
DBCP Drinking Water Criteria Document

Explanations and defenses of cancer assessments in scientific and regulatory areas; meetings and workshops.

Presentations to the Science Advisory Board on PCBs, styrene, and acrylamide
Workshop on DEHP
Presentations to the Office of Management and Budget (OMB) on CERCLA reportable quantity methodology and assessments

Research program to improve health risk assessment by identifying and reducing uncertainty. Specific projects are:

Physiologically based pharmacokinetic models

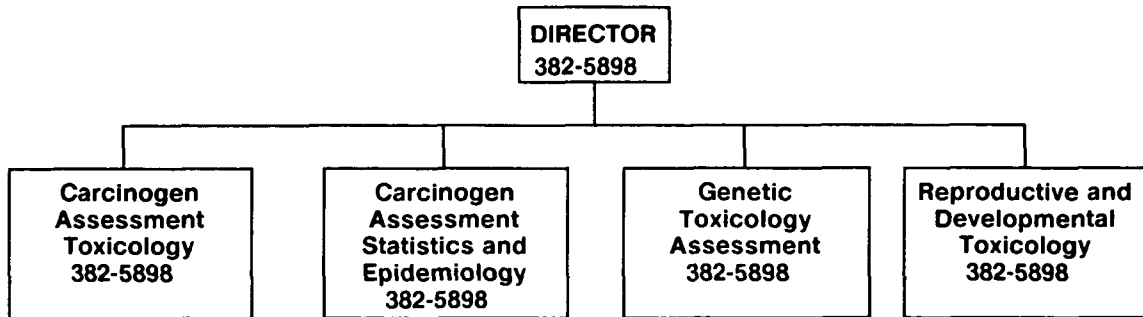
Biologically based dose-response models

Analyses of uncertainty

Most Important Publication

Human Health Risk Assessment Guidelines: Carcinogenicity, Mutagenicity, Developmental Toxicants, Male and Female Reproductive Risk

Human Health Assessment Group



Environmental Criteria and Assessment Office - Cincinnati



Steven D. Lutkenhoff is the Acting Director of the Environmental Criteria and Assessment Office in Cincinnati, OH (ECAO-Cin). He previously served as Deputy Director from 1984 to 1987. Lutkenhoff came to the Agency in 1972 as a Research Scientist for the Health Effects Research Laboratory - Cincinnati and worked in that position until he came to ECAO-Cin as a Staff Physiologist in 1979. He began his career as Medical Laboratory Technician at St. Luke Hospital Laboratory. He was the recipient of a Bronze Medal in 1980 and is a member of numerous professional organizations. Lutkenhoff is a graduate of Thomas More College with a B.S. in Biology.

Functions

The Environmental Criteria and Assessment Office in Cincinnati, Ohio (ECAO-Cin) is responsible for preparing criteria and assessment documents and developing risk assessment methodology and guidelines. The ECAO-Cin (1) prepares and publishes new or revised criteria documents when needed as input for setting environmental standards, (2) prepares and publishes scientific assessment documents/health risk assessment reports, which will serve as a basis for decisions by the EPA Administrator regarding the listing of pollutants for standards and control under various legislative authorities, and (3) develops risk assessment methods, which provide guidance for evaluating potential risks to human health from exposure to environmental pollutants. The ECAO-Cin has three branches:

- The *Chemical Mixtures Assessment Branch* provides support for the development of background documentation and technical support necessary in the formulation of human health risk assessment activities as mandated by both the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Resource Conservation and Recovery Act (RCRA). These assessments establish the basis for regulatory activities associated with

the potential human exposure to environmental pollutants, particularly chemical mixtures.

- The *Methods Evaluation and Development Staff* coordinates the development of risk assessment methods for chemical mixtures and systemic toxicity and reviews new methods in response to identified Agency needs. The branch also coordinates the Agency's Integrated Risk Information System (IRIS). This activity helps ensure that the Agency's risk assessments remain credible and that state-of-the-art methods are continuously developed.
- The *Systemic Toxicants Assessment Branch (STAB)* provides support for the development of background documentation necessary in the formulation of human health risk assessment activities as mandated by the Clean Water Act (CWA) and the Solid Waste Disposal Act (SWDA). Specific outputs include criteria documents, health advisories, position papers for variance requests, and disposition documents.

The purpose of the Integrated Risk Information System (IRIS) is to provide information on Reference Doses (RfDs) or risk estimates of

Environmental Criteria and Assessment Office - Cincinnati

carcinogenicity (RECs) for which consensus across the Agency has been achieved. This consensus has been reached through the work of the Intra-Agency Reference Dose Work Group or the Carcinogen Risk Assessment Verification Endeavor Work Group, both of which are chaired by ECAO-Cin scientists. This endeavor has eliminated the confusion generated by use of differing risk assessment values by various Program Offices and ORD and has identified issues regarding risk assessment methodologies used and the data bases available.

The development of qualitative or quantitative risk assessment methodologies for municipal sludge disposal/reuse will directly influence the Office of Water Regulations and Standards (OWRS) in regulating the impact of sludge on the environment.

The final "Guidelines for the Health Risk Assessment of Chemical Mixtures" and the development of the "Risk Assessment Guidelines for Noncarcinogenic Health Effects" benefit the entire Agency by providing definitive methodologies to determine the impact of pollutants on human health.

ECAO-Cin played a direct part in the decision process of OWRS as to the most efficient and effective procedure to update the 1980 Ambient Water Quality Criteria as mandated by the 1987 amendments to the CWA. ECAO-Cin will be responsible for developing these updates.

OHEA/ECAO-Cin is responsible for developing risk assessment criteria, in the form of Health and Environmental Effects Profiles/Documents, Health Effects Assessments, and Reportable Quantity Documents for chronic toxicity, that will be used for regulatory purposes by the Office of Solid Waste and Emergency Response (OSWER) as mandated by RCRA and CERCLA.

OHEA/ECAO-Cin participates in a cooperative effort with the Office of Toxic Substances (OTS) and the Agency for Toxic Substances and Disease Registry (ATSDR) to both develop and review Toxicological Profiles as mandated by the Superfund Amendments and Reauthorization Act (SARA). This mandate requires ATSDR to prepare profiles for each substance included on the first priority list of 100 chemicals, which both the U.S. Department of Health and Human Services (DHHS) and the U.S. EPA determined posed the most significant potential threat to human health,

found at facilities on the CERCLA National Priorities List.

OHEA/ECAO-Cin participates directly with OSWER in preparing Listing/ Delisting Packages. This procedure involves the scientific evaluation of specific chemicals to either be added or deleted from the List of Hazardous Wastes under RCRA.

OHEA/ECAO-Cin participates directly with OTS to determine Test Rule Development for specific chemicals under TSCA.

FY88 Products

Public Comment Draft Toxicological Profiles for 12 chemicals (beryllium, chloroform, chromium, nickel, N-nitrosodiphenylamine, PCBs, dioxin, cyanide, lead, vinyl chloride, tetra-chloroethylene, trichloroethylene); intra-Agency effort with OTS and ATSDR as mandated by SARA.

Development of Reportable Quantity (RQ) documentation for Extremely Hazardous Substance List (116 chemicals) under Sections 101-102 of CERCLA/Superfund.

Public release of the Integrated Risk Information System (IRIS) containing 380 assessments. In addition, the verification of 100 Reference Doses (RfDs) and risk estimates for carcinogenicity (RECs) for IRIS.

Sponsorship of the International Symposium on Chemical Mixtures: Risk Assessment and Management (June 1988).

Preparation of Guidelines for the Development of Ambient Water Quality Health Advisories under the CWA.

Final Public Comment Drafts for 30 Phase II Drinking Water Criteria Documents and External Review Drafts for 15 Phase V Drinking Water Criteria Documents under the Safe Drinking Water Act (SDWA).

Final Drafts for 30 Drinking Water Health Advisories and 10 Water Quality Health Advisories for the Office of Drinking Water's (ODW) and OWRS's nonregulatory Health Advisory Program.

Environmental Criteria and Assessment Office - Cincinnati

Completion of 50 Health and Environmental Effects Documents for OSWER under RCRA and CERCLA.

Development of 80 Reference Doses (RfDs) in support of the Land Disposal Ban.

Final Draft of the Technical Support Document on Risk Assessment of Chemical Mixtures to supplement the 1986 Guidelines for the Health Risk Assessment of Chemical Mixtures.

Internal Review Draft of the Risk Assessment Guidelines for Noncarcinogenic Health Effects in collaboration with the Risk Assessment Forum.

Finalization of Development of a Qualitative Pathogen Risk Assessment for Ocean Disposal of Municipal Sludge and Sludge Landfilling; and Development of Risk Assessment Methodology for Land Application and Distribution and Marketing of Municipal Sludge, Municipal Sludge Incineration, Municipal Sludge Landfilling, and Ocean Disposal of Municipal Sludge for OWRS.

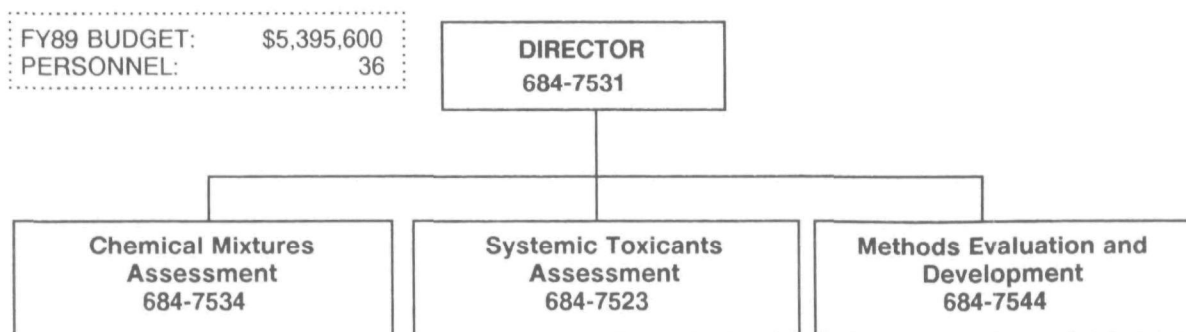
Development of Methodology for the Assessment of Health Risks Associated with Multiple Pathway Exposure to Municipal Waste Combustor (MWC) Emissions for OAQPS.

Availability to the public by the National Technical Information Service (NTIS) of approximately 100 Health Effects Assessment documents and approximately 200 Health and Environmental Effects Profiles. Previously these documents were only available from the RCRA docket and OSWER's Office of Emergency and Remedial Response (OERR) and not listed on any public data base. This action both informs the public sector and relieves the Program Offices of responding to requests.

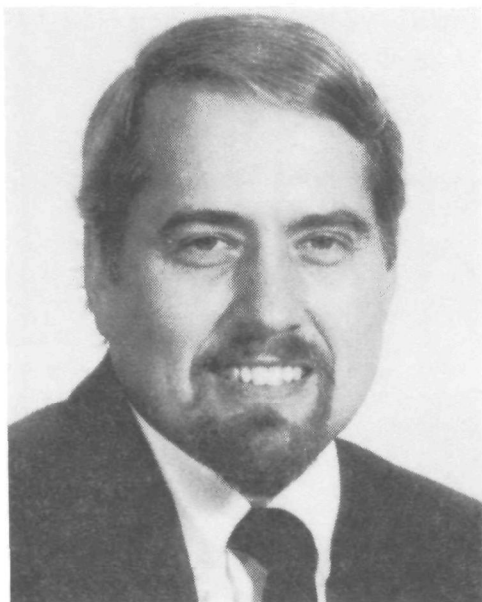
Most Important Publication

Proceedings of International Symposium on Chemical Mixtures Risk Assessment and Management. Special Monograph Issue of Toxicology and Industrial Health

Environmental Criteria and Assessment Office - Cincinnati



Environmental Criteria and Assessment Office - Research Triangle Park



Lester D. Grant has been the Director of the Environmental Criteria and Assessment Office in Research Triangle Park (ECAO-RTP) since 1978. From 1970 to 1980, he rose from Instructor to Associate Professor in the departments of Anatomy and Psychiatry at the University of North Carolina. He was awarded two EPA Bronze Medal Awards and one EPA Gold Medal Award. He received a Ph.D. and master's degree in Organizational/Physiological Psychology from Carnegie-Mellon University and a bachelor's degree in Social Psychology/ Pre-Med Program from the University of Pittsburgh.

Functions

The Environmental Criteria and Assessment Office at Research Triangle Park is primarily responsible for preparing criteria and other assessment documents for use in Agency regulatory activities. The primary activities consist of preparing and publishing (1) revised or new criteria documents when prescribed by legislation or requested by national decision-makers, (2) health and environmental assessment documents that serve as a basis for decisions by the EPA Administrator regarding the regulation and control of pollutants, and (3) special health-related reports as required by the Agency's various legislative activities or as especially requested by other governmental authorities. The ECAO-RTP carries out these functions through its Environmental Media Assessment Branch, Hazardous Pollutant Assessment Branch, and Technical Services Staff.

The Environmental Media Assessment Branch develops broad (usually multi-disciplinary) assessments of widespread pollutants or classes of pollutants. These assessments require substantial evaluation and integration of information not only on health effects, but also on ecological or other environmental effects. Additionally, they include background information on sources, emissions, transport and fate, and exposure aspects. Activities include the preparation of air quality criteria

documents and the preparation or review of cross-media pollutant assessments.

The Hazardous Pollutant Assessment Branch conducts detailed studies of health (toxicological) effects associated with specific individual pollutants or classes of pollutants. A principal activity is the review or preparation of health assessments for particular pollutants under consideration for possible listing as Hazardous Air Pollutants. Another is the review or preparation of assessments of the health effects of specific substances or classes of substances evaluated for regulation under Superfund or water quality statutes.

The Technical Services Staff provides literature searches and retrieval, reference verification, and bibliographic database management; editing and graphics services; automated system support; conference support services, and distribution and printing. TSS also maintains docket and project files, and assures ECAO-RTP conformance to Agency and ORD policies for peer and administrative review, ADP and quality assurance.

Environmental Criteria and Assessment Office - Research Triangle Park

FY88 Products

"Proceedings of Symposium on Lead-Blood Pressure Relationships, Special Monograph Issue of Environmental Health Perspectives"

"Acid Aerosols Issue Paper"

"Report to Congress EPA Indoor Air Quality Implementation Plan: Appendix A: Preliminary Indoor Air Pollution Assessment Appendix E: Indoor Air Reference Data Base "

"Health Assessment Document for Beryllium"

"Summary Review of Health Effects Associated with Naphthalene"

"Summary Review of Health Effects Associated with Propylene"

"Summary Review of Health Effects Associated with Monochloroethane"

"Summary Review of Health Effects Associated with Sodium Hydroxide"

"Summary Review of Health Effects Associated with Propylene Oxide"

"Summary Review of Health Effects Associated with Zinc and Zinc Oxide"

"Referee: Bibliographic Database Manager "

"Establishment of Air RISC Hotline"

"Indoor Air Reference Data Base"

"Technical Assistance/Physical Production of ATSDR/EPA Report to Congress on Nature and Extent of Childhood Lead Poisoning in the United States"

Most Important Publication

Proceedings of Symposium on Lead-Blood Pressure Relationship. Special Monograph Issue of Environmental Health Perspective

Environmental Criteria and Assessment Office - Research Triangle Park

