DIRECTORY OF COOPERATIVE UNIVERSITY AND INDUSTRY ENVIRONMENTAL RESEARCH AND DEVELOPMENT CENTERS

Office of Cooperative Environmental Management
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Directory of Cooperative University and Industry Environmental Research and Development Centers

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Preface

Purpose of This Book

The 1990s is the decade of the environment. In the United States and throughout the world, there is widespread recognition that a renewed commitment to environmental protection is vital for maintaining both quality of life and economic vitality.

Part of this renewed commitment is seen in the rapid growth of research and development (R&D) related to environmental technology. By environmental technology, we mean any set of techniques that combine instruments or machines with human action for the purpose of creating reproducible outcomes relevant to environmental protection. Under this definition, environmental technology is intentionally broad. It ranges from monitoring technology for detecting trace gases in rural areas, to improving industrial painting systems that reduce waste, to developing biodegradable detergents for washing clothes.

Creating the scientific and engineering knowledge base for continued advances in environmental technology is a demanding task requiring multi-disciplinary approaches, sophisticated experimental equipment, and advanced computing capabilities. As a result, the environmental R&D community — like other researchers in modern science and engineering — has had to seek out ways to better institutionalize arrangements for leveraging scarce R&D resources and rapidly transferring new knowledge into practical applications.

The cooperative university and industry research center has become a major force in the conduct of multidisciplinary generic research with potential practical applications. There are more than 200 environmental technology cooperative research centers in the United States alone. More than 100 of them run annual budgets in excess of $1 million.

These centers represent a pool that can enable American industry and government to meet their needs for environmental technology and knowledge in a more cost efficient manner. Yet because there has been no comprehensive directory of such centers, managers have often found themselves "reinventing the wheel."

Recognizing that the lack of a comprehensive guide to these centers inhibited their use by the environmental and business communities, the Office of Cooperative Environmental Management, U.S. Environmental Protection Agency (EPA) funded Foresight Science & Technology Incorporated to catalogue all environmental technology centers in the United States. *The Directory of Cooperative University and Industry Environmental Research and Development Centers* presents the results of this study.

This *Directory* enables users to:

- Locate relevant expertise and technology at centers
- Find names of contact points at centers
- Read an overview of the activities of each center
- Assist in developing additional industry and government participation in centers
- Increase cooperation among centers through greater awareness of others working in environmental R&D.

Organization of the *Directory*

The *Directory* is organized into six sections.

The "Preface" introduces the *Directory.*

The "Overview" provides an introduction to cooperative university and industry R&D centers and how they can assist in the development of knowledge and technology for environmental protection.

"Background on Cooperative University and Industry R&D Centers" provides a brief history of centers in the United States and discusses features that help make them successful.

"The Directory of Cooperative University and Industry Environmental R&D Centers" contains detailed data on 114 centers with budgets in excess of $1 million and/or EPA support. Information includes a brief description of the center and data on size and scope, major areas of expertise, activities conducted, current major projects, technology transfer and outreach activities, and history.

The appendix to the directory, "Other Cooperative University and Industry Environmental R&D

Centers," contains a brief listing of all other centers identified with funding of less than $1 million.

Four indexes will help you rapidly locate centers of particular interest to you.

Center Name Index (arranged by center name) is cross referenced to university/industry name

Geographic Index (arranged by state and city) for all centers listed in the *Directory*

Personal Name Index (arranged by personal names of center directors) including name of center and full address

Subject Index (arranged by subject specialties of centers)

Table of Contents

Overview: The Utility of Cooperative R&D Centers for Developing Environmental Technology

Environmental technology is any set of techniques combining instruments or machines with human action for the purpose of creating reproducible outcomes relevant to environmental protection. It is important to recognize that under this definition, not all environmental technological improvements result from R&D.

As in other technologies, innovations can emerge from a variety of sources. Especially where small, incremental innovations are involved, it is the people with extensive hands-on experience who often generate them. Thus, in manufacturing, ways of using machine adjustments to eliminate wasteful use of raw materials are often first seen by production workers. The ability to stimulate such innovation is one of the arguments supporting quality control circles in factories. Other innovations come from "garage shop" inventors. Here an individual's insight, for whatever reason, enables one to see a solution that has escaped others.

Despite the multiple sources of technological innovation, it remains true that in today's increasingly complex industrial order, systematic R&D looms ever important as the driver of technology.

Why Centers?

R&D has always played a role in technological innovation. But prior to World War II, little attention was paid to how to best organize linkages between the R&D community and the end-users of information generated in industry and government.

Until about 20 years ago, two models for organizing the link between R&D and R&D users predominated — university and industry.

In the universities, the traditional method for conducting R&D involved a single investigator or a small team working on a project. The problems being studied were selected based primarily on the intellectual curiosity of the researchers. It was a matter of chance whether anything relevant for practical application would emerge. Researchers or teams would pursue work on their own, sharing the knowledge they gained through publication in the scientific and engineering literature, papers at professional meetings, and informal correspondence. Transfer of knowledge into practical applications would take place only if someone from industry or government happened to become aware of the research results.

Although practical issues did not greatly influence the selection of research topics, and despite the fact that technology transfer was not viewed as a major concern, this model did produce impressive results, particularly when R&D funds were plentiful. It enabled a diversified, multifaceted research agenda to go forward. American researchers, pursuing their own ideas, came to dominate world science and engineering — as reflected in the capture of Nobel Prizes. One result was that a great supply of "intellectual seed corn" was generated. When tapped by entrepreneurs from both large and small companies, this knowledge provided the basis for industries such as biotechnology and photonics.

Although the traditional model remains an important part of American R&D, two problems have limited its utility during the latter part of the 20th century. First, the cost of conducting R&D has expanded greatly as sophisticated experimental and computational tools have become necessities. The capital to purchase these tools can often be found only when the researchers are brought together to share the equipment. Second, the explosion of knowledge generated under the traditional model created a situation in which researchers had to increasingly specialize to push the frontiers of their fields. Yet specializing means that many research issues can only be addressed by building larger interdisciplinary teams which rely on cooperation and coordination for their success.

In industry too, most work was conducted by single investigators or small teams. However, in contrast to university research, because the work was

supported by a company, R&D generally focused on specific problems. Larger companies often had a two-tier laboratory structure. Most labs were attached to specific production units and worked on quick turn-around solutions. A central corporate lab would focus on longer-term problems relating to new product development. But even at the central lab level, funding was driven by people in the company looking for solutions to their problem. There were few places (like Bell Laboratories) where companies supported high-risk, long-term, open-ended basic research.

Although transfer of the resulting knowledge into practical application was less of a problem in industry, this R&D model had other weaknesses. Most importantly, the focus on shorter-term problems meant that there was little time to explore more generic research issues which might lead to breakthroughs. Nor were there many opportunities to pursue promising lines of research, because once a specific problem was solved, the scientist or engineer was expected to take up the next item on the company's already full agenda.

By the 1960s, it was clear that what was needed was an institutional format which could bring together the broader, more generic R&D focus of the university and the applications orientation of industry. At the same time, this institutional format had to be able to aggregate resources to make it feasible to buy the expensive tools and support the larger teams needed to conduct larger R&D projects.

The cooperative university/industry R&D center provides this institutional format. Drawing financial support from academia, industry, and often government, the center is able to leverage scarce resources. By conducting a multiproject research agenda in a generic problem area, the center brings together a critical mass of researchers. Industrial participants help shape the center's research agenda, contributing to its relevance for subsequent practical applications. At the same time, the presence of the center in a university and its multiple sponsorship helps ensure that the research conducted is more generic than that found in company laboratories.

The results are:

- A synergistic environment for the generation of knowledge so that results from one project can be rapidly shared among the research teams at the center and the center's sponsors; and,
- A more rapid transfer of knowledge into practical applications as industrial participants use the R&D results to gain a return on their investment in the center.

Definition and Functions of Cooperative University and Industry Environmental Research and Development Centers

For purposes of the *Directory*, we have included centers which have four distinguishing features:

1. The research program is primarily carried out by a university or a cooperating set of universities.
2. The primary user communities for the results of the center's research program are private companies, governments, or nonprofit environmental organizations.
3. The sources of research funding and in-kind support include private companies from the user communities, which have self-identified needs for new environmental knowledge and technology, but may also include government and other private sector sponsors.
4. The ultimate objective of the center is to transfer the scientific, engineering, and technical knowledge it develops to its user communities.

Centers meeting these criteria serve three important functions in support of the environment:

1. They develop technology which solves specific environmental problems.
2. They generate knowledge needed to support further advances in environmental technology.
3. They develop environmentally progressive technology which enables industry to avoid the traditional antagonism of environmental protection versus financial reward.

These functions are not unique to these centers. Research conducted by EPA laboratories, through traditional academic methods or by industry teams, can also serve these functions. Yet what these centers bring is an organizational structure for R&D management and the conduct of research and technology transfer which has been explicitly designed to fulfill these functions.

Benefits of New Environmental Knowledge and Technology and Their Dissemination

Three major benefits result from new environmental knowledge and technology:

1. Increased capability to address environmental concerns
2. Expansion of scientific and engineering knowledge

3. Opportunities to transcend the traditional antagonism between environmental protection and economic growth.

First, technological innovations can help solve some of our most pressing environmental problems. Many environmental laws incorporate the notion that polluters must use the best available technology to monitor and mitigate environmental problems. As innovations are developed, the quality of environmental protection is thereby enhanced. The results of this approach are everywhere. For example, over the past two decades, smokestack scrubbers have almost entirely eliminated traditional black cloud industrial pollution in the United States.

Second, environmental R&D contributes to the science and engineering knowledge needed for future technological innovations. R&D relevant to environmental technology is a multidisciplinary matter. As a result, background knowledge and technological innovations result from a two-way interaction between environmental specialists and other researchers. Ideas generated in nonenvironmental scientific and engineering disciplines are applied in new ways to address environmental issues. These applications, in turn, create new insights which cross-fertilize other parts of science, engineering, and technology.

The interactive manner in which advances in knowledge relevant to environmental technology are made can be seen in the following example. Physicists and chemists have explored the changes that high energy particles can introduce in materials. Building on this basic research, The Drinking Water Research Center at Florida International University recently developed a new approach to removing pollution. The center built a pilot plant which uses an electron accelerator to bombard waste water with high energy electrons. The plant can treat approximately 175,000 gallons of water and waste per day.

Major advances in nonenvironmental knowledge can, in turn, result from efforts to solve specific environmental problems. One example with respect to monitoring comes from the Superfund Program. During clean-up efforts, workers were hampered by the behavior of pollutants in water. Some wastes clumped together and formed what are called dense nonaqueous pollutant layers (DNAPLS), which sink to the bottom of lakes and streams. Other pollutants are not dense (NAPLS), and thus float on top. This discovery has heralded a new body of knowledge and research on the interaction, transport, and fate of these layers.

Third, and finally, from a practical applications standpoint, generic R&D can help move us beyond the traditional tradeoffs between environmental protection and economic productivity and profits. One example of economically beneficial pollution control comes from the metal plating industry. EPA regulations required companies to recycle waste water which contained large levels of cyanide. Cyanide was a particular problem for the jewelry industry. The industry's initial response was that profits and productivity would suffer due to environmental protection. The development of a recovery process using ion transfer technology changed that attitude. Companies discovered that the process enabled recovery and reuse of previously lost gold, silver, and platinum, resulting in increased revenues.

Another example of a spinoff benefit for industry from environmental technology can be found in the auto industry. Researchers at EPA's Atmospheric Research and Exposure Assessment Lab at Research Triangle Park were working on the effects of acid rain on metal corrosion. In the process, they discovered new ways to analyze and track the behavior of materials as they weather. After learning about these techniques, Ford Motor Company used the Federal Technology Transfer Act of 1986 to contract with the lab for a study on the lifetime of automobile coatings and paints.

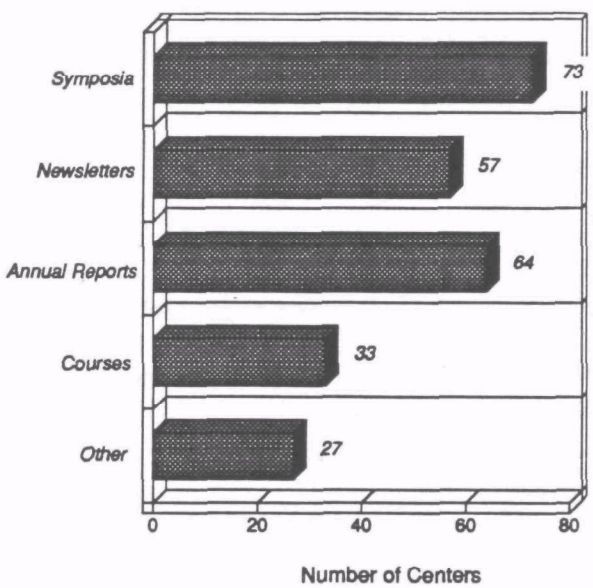
To get such benefits to their user community, cooperative environmental R&D centers use a variety of passive and active techniques. Those most widely used are "passive" in the sense that the center or its participants make information available but do not actively seek out parties who may be interested in the information. Examples of passive technology transfer include the traditional academic methods of giving papers at professional meetings, publishing research results in the scientific and engineering literature, and patenting. (When centers such as the Texas Agricultural Experiment Station at Texas A&M University file their patents, the patent serves as the information disseminator). Newsletters, such as that produced annually at the Center for Complex Flow Measurements at Case Western University, are also commonly used passive techniques. Annual reports serve a similar function.

To some extent, all centers also use "active" technology transfer techniques. Obtaining and keeping industrial and government sponsors is an active outreach and liaison effort. Centers such as the En-

vironmental Research Center at the University of Nevada, Las Vegas hold symposia and meetings on topics related to their research agenda. Many centers, such as the Center for Research in Water Resources at the University of Texas in Austin, have active programs of short courses. Perhaps the most aggressive active outreach is seen at centers affiliated with land grant institutions. For example, Michigan State University's Pesticide Research Service uses the Cooperative Extension Service as a technology transfer tool for reaching one of its user communities.

The following chart indicates the use of various technology transfer techniques by the major centers surveyed.

Technology Transfer Techniques



In addition, this *Directory* provides the names, addresses, and phone numbers of the directors of each center listed. These individuals can assist *Directory* users tap the resources of their centers.

Sources of Center Funding

Funding for university and industry cooperative environmental R&D centers typically comes from organizations that benefit from the research conducted or those interested in stimulating the development of environmental knowledge and technology. The three primary sources of funds are the Federal Government, state governments, and industry. Other sources include the host university, foundations, and nonprofit organizations representing industries with environmental concerns or citizens promoting environmental issues. Additional funds are obtained through licensing technology developed at the center as well as fees charged for publications, educational and training courses, and meetings.

The chart below shows the percentage of funds from various sources going to the centers included in this *Directory* and the aggregate amount from each source.

Sources of Funding
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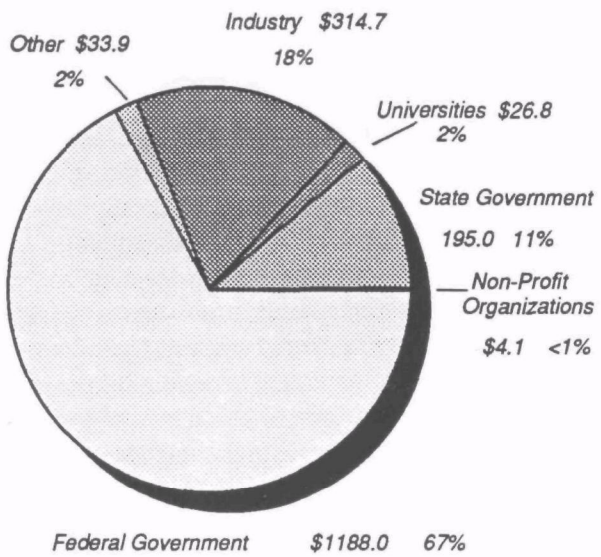


(dollars in millions)

Technical Areas of Expertise of Cooperative University and Industry Environmental R&D Centers

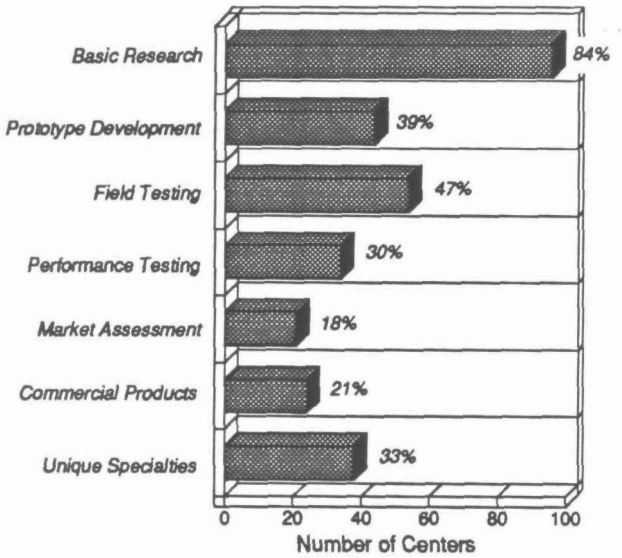
Because of the interdisciplinary character of environmental R&D, a vast range of expertise is found at the various centers. This expertise is utilized across the R&D and product development spectrum. The most prevalent activities of centers are basic and applied research. Product development (including plant and animal breeding) is also conducted at many centers. As part of these activities, many centers have developed unique facilities and labs. For example, the Geophysics Institute at the University of Alaska at Fairbanks operates the Poker Flat Rocket Range. Crocker Nuclear Laboratory at the University of California at Davis operates 60 air sampling stations across the U.S. The Waste Management and Research Consortium at New Mexico State University runs a waste isolation pilot plant.

Supplementing core R&D activities are services for business and government. A few centers, such as

the National Environmental Technology Applications Corporation (NETAC) at the University of Pittsburgh will evaluate innovations for commercialization. Other centers, such as the Institute of Water Research at the University of Michigan, have programs that assist government officials to better understand environmental information and to integrate that information into public policy.

The following chart indicates the relative importance of activities for the major centers surveyed.

Current Activity Mix



Relation to Environmental Concerns

The research projects of cooperative environmental R&D centers can be related to specific environmental concerns. For purposes of this *Directory*, nine specific focuses have been distinguished. The Subject Index helps readers locate centers working in each of these specific areas. As most centers conduct work that falls into more than one area, centers are listed under each relevant category.

Hazardous Substances. Hazardous substance concerns all aspects of the EPA Superfund program as well as smaller cleanup efforts. Among the research areas included are: health effects, risk assessment, alternative technology, fate and transport, and ecological risk.

Solid Waste. This area relates to the EPA Solid Waste Office and is concerned with wastes from the cradle to the grave. Included are the development of better management techniques for handling wastes, as well as new ways to minimize their production. Other topics are: human health effects, risk assessment, land disposal, recycling, waste treatment, waste minimization, municipal solid waste, and transport and fate.

Air Quality. Related to the EPA division with the same name, research in this area is concerned with both outdoor and indoor air quality. Research projects may relate regulatory efforts such as the National Air Quality Standards (NAQS) and the New Source Performance Standards (NSPS) for new plants; or more generic efforts involving hazardous air pollutants, mobile source pollutants, indoor air quality, stratospheric ozone, global warming, acid deposition and acid rain, combustion, and air radiation.

Water Quality. Research in this area involves environmental concerns in both fresh and salt water. Among the topics are oil spills, waste water treatment technology, ground water, health effects of drinking water contaminants, drinking water technology, and marine estuaries and lakes. Also included are aquaculture and studies related to marine plants and animals.

Pesticides and Toxicology. Again related to the concerns of an EPA division, this area includes the effects of pesticides and toxic substances on the environment and human health. Among the relevant topics are biotechnology, test methods development, human health, asbestos, exposure monitoring, ecological fate and transport, ecotoxicology, and pesticide disposal.

Agriculture and Ecology. While overlapping somewhat with areas listed above, R&D under this category focuses on the monitoring and/or improvement of agriculture. Ecological studies include general studies, wildlife management, endangered species, etc. Restoration issues are also included.

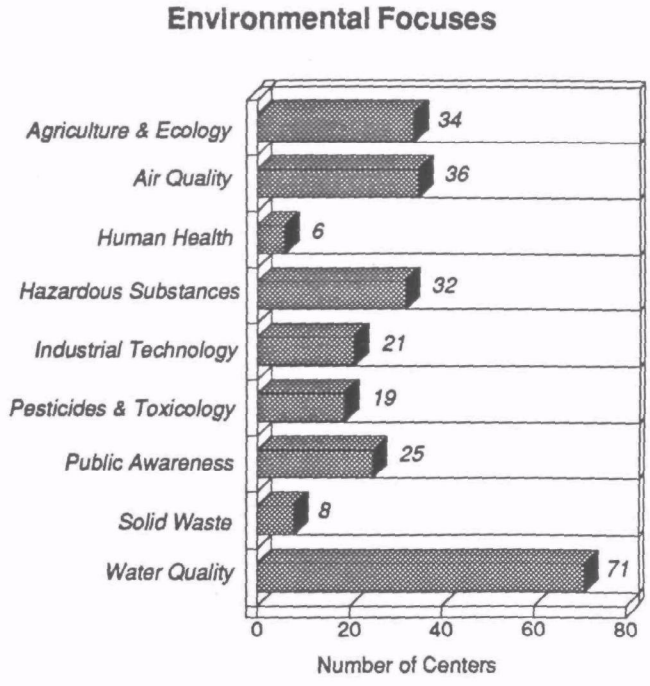
Industrial Technology. Research in this area relates to environmentally sensitive innovations in process technology or products. Examples of topics include better controls for industrial processes, new techniques such as applications of lasers to cross-cutting monitoring technology, and new or improved energy sources (such as solar, wind, and geothermal energy generation systems).

Cross-Cutting Human Health. While the focus of identifiable impacts on human health from particular environmental concerns is dealt with under

other topics, this area includes more general studies on environmental health. Topics range from health effects in the home to occupational environmental health to human genome studies.

Public Awareness. Studies in this area involve the assessment of what specific groups or the public in general know about the environment and of their concerns about the environment. Social scientific research related to environmental issues also falls within this area, as do projects involving the development of ways to increase awareness of environmental issues and to avoid or mitigate environmental problems. Land-use studies are included as part of avoiding or mitigating environmental problems.

The following chart indicates the number of major centers with specific environmental focuses. As noted earlier, centers with more than one focus are included in each relevant category.



Background on Cooperative University and Industry R&D Centers

What Is a Center?

Cooperative university/industry environmental R&D centers are generally recognized by a set of basic structures and attributes which identify the center as a separate and distinct institution. Thus, they differ from an informal team or area of emphasis within an academic department or interdepartmental cooperative program.

Structurally, each center has independent leadership/ management, research, and support components which identify it as a distinct organizational entity. Leadership is commonly exercised by a noted scientist or engineer who serves as the center's director. The director is frequently supported by deputy directors for administration and for industrial and government liaison. The research components may take a variety of organizational formats, ranging from floating project-specific teams to dedicated labs for various studies to departments distinguished by area of expertise. Regardless of the format, staffing consists of specialists from all professional levels. Often there is a core of Ph.D. level scientists and engineers who have joint appointments both in the center and in an academic department. These individuals are supplemented by senior Ph.D. level researchers and fellows with Ph.D.s who hold appointments only in the center. In-house staff may be supplemented by researchers on loan from industrial and government sponsors of the center. A staff of masters- and baccalaureate-level technicians is employed by the center to support the research program. Finally, a cadre of graduate and, less frequently, undergraduate students from the university rounds off the research staff. The support components consist of the personnel normally found in any major research entity. Departments are established to handle accounting, fund-raising, maintenance, etc.

From an attributes standpoint, the distinct research focus of these centers provides an intellectual cohesiveness to the institution. Associated with this focus are:

- Research projects within the general research focus
- Research personnel from different science, engineering, and business-related disciplines
- Research facilities and equipment sufficient to support both single and multiple project needs
- Administrative, maintenance, and other support personnel and facilities capable of supporting the R&D program
- Funding to support current activities, plan future activities, and support marketing to obtain future funds
- Private and public sector efforts to learn of the outcomes of the R&D being conducted.

Cooperative R&D centers are often confused with R&D consortia. While the two are similar, they differ in terms of the integration and concentration of their research and the make-up of their sponsors.

Consortia tend to concentrate on a small number of R&D projects that are well integrated. Because of their tight focus, all consortia participants are equally interested in all of the program activities. One of the best known consortia is the Microelectronics and Computer Corporation (MCC) in Austin, Texas.

The industrial sponsors of consortia encourage a focus on technology that can be shared by all participants without adverse competitive impacts on any of them. Typically, the focus is on generic R&D that leads to improvements in production technology. Although production technology is key for productivity enhancement, competition is not generally based on manufacturing prowess. Still, companies need state-of-the-art production in order to be able to sustain product competition. Conducting such R&D through the consortium enables the sponsors to reduce the costs of obtaining state-of-the-art manufacturing capability. Establishing the feasibility of a new product line may be another focus. By conducting the higher risk, longer-term feasibility study at the consortium, the risk in new product development for the members is reduced. Further, where feasibility is established, the knowledge needed for rapid product development is

available. Once feasibility is established, the project is commonly terminated, and the results are transferred to the consortium's members. They do the actual product development, with the result that several proprietary variants emerge on the market.

A consequence of the tighter focus is seen in the funding of consortia. Because the sponsors are predominantly from private industry, there is tighter adherence to industrial goals of obtaining R&D results that can be readily integrated into production or other business activities.

Although dominated by the private sector, government agencies are involved in many consortia. An agency may serve as the host of a consortium, even when industrial support predominates. In such instances, the consortium's agenda closely matches the mission of the agency. An example is the Consortium for Automated Analytic Laboratory Systems at the National Institute for Standards and Technology in Washington, D.C. A government agency also may provide financial support when the consortium's research program reflects mission needs of the agency. Department of Defense support for the Semiconductor Research Corporation (SRC) in Raleigh, N.C. is an example.

In contrast, centers typically have a more diffuse research program, combining both longer-term basic research and more targeted applied research and development. The more diffuse agenda offers industrial sponsors a "window" on emerging knowledge in the research area of the center while still meeting more immediate concerns through at least some of the projects being conducted. Yet a consequence of conducting some projects beyond the short-term needs of industrial sponsors is that state, Federal, and foundation sources of R&D funding typically must be tapped, too. This phenomenon occurs at the National Science Foundation Center of Excellence in Computer Software at Carnegie-Mellon University and the Cornell University Center of Excellence in Small Particle Physics.

Activities of Centers

Most centers combine three activities: R&D, business development and services, and training and education. Depending on the focuses of the center, these activities will have differing importance.

Research and Development. The research agenda of most centers emphasizes applied research. Although basic research is conducted, it is typically "generic" work targeted towards enhancing the knowledge base required for applied research.

Although the emphasis is on applied research, product development is conducted by most centers. Except where an individual product or process development has been specified by a funding organization as a condition of financial support, the product development work is conducted at the "precompetitive," proof of feasibility stage. This orientation makes it possible for companies which normally compete at the product development level to join a center where all supporters share the results.

Looked at nationally, the research focuses of centers are extremely wide. We have already indicated the range of diversity within environmental centers. The National Science Foundation, the leading government agency for stimulating the formation of cooperative centers, has initiated more than 60 centers engaged in research ranging from analog/digital circuits and advanced electron devices for telecommunications to welding, to advanced combustion, to biotechnology process engineering, and robotic systems in microelectronics.

Business and Development Services. The primary business service provided by cooperative university/industry research centers is technology transfer. A variety of mechanisms are used, including special meetings for sponsors, research fellows from sponsors, general symposia, newsletters, short courses, patent licensing, and extension services.

Some centers go further. Centers may provide services such as new product assessment, scientific and engineering literature reviews, technical market research, and business planning to smaller businesses. Because the resource base of their small business clientele is limited, these activities are typically underwritten by Federal agencies (such as the Small Business Administration) or state high technology economic development agencies.

Centers sometimes establish an affiliated innovation and/or incubation facility in order to encourage entrepreneurial spinoffs from research programs. These facilities may be either public or private. Centers may seek a return on investment by taking equity positions in the companies assisted.

Training and Education. Training and education are major adjuncts of most R&D centers. From the university side, emphasis is usually placed on providing graduate students with industrially relevant experience. Short courses and symposia for industrial

and government researchers also are common and frequently used as supplemental sources of income.

Motivations for Forming Centers

Centers are formed when universities and industry perceive an opportunity for long-term collaboration on pressing problems. The university usually is seeking a way of leveraging additional financial and in-kind support to enable its faculty to work on challenging problems. Additionally, the university often is seeking to better meet its educational and training mission by providing to faculty and students exposure to industrial needs and research capabilities. For its part, industry usually is looking for a steadily expanding pool of solutions to a problem area. If the problem is not perceived as pressing, industrial financial support is difficult to obtain. Yet the character of the problem must be generic, somewhat amorphous, and require a multi-year effort. A further motivation is to influence the training of students and better meet recruitment needs.

Problems which are too highly specific and short-term do not lend themselves to solution through centers. For example, suppose a company wants to create a better resin for a particular high-temperature composite in order to make structural parts for an aerospace plane. The company likely will mount an in-house effort to conduct the R&D. In this case, a collaborative effort with a university and other competitors may not be appropriate because the specific knowledge sought may provide a competitive advantage for the company which develops it. Further, because the problem is clearly defined, the project can be controlled through normal industrial R&D management techniques. Progress can be assessed against a substantive goal and project completion date. When the rate of progress is unsatisfactory, specific corrective steps can be taken.

More diffuse, longer-term problems lend themselves to a center. For example, suppose the problem is how to create higher temperature composites in an environmentally acceptable manufacturing process. This problem is of interest to aircraft companies, auto companies, engine manufacturers, boiler manufacturers, and so forth. While important for each of them, they are end-users of the composites so they do not compete directly. Thus, there is a substantial pool of underlying knowledge and technology which can be shared without giving any one company a significant competitive advantage. Also, there is no clear end point for the research. Better and better high temperature composites can be developed over the years. A collaborative effort makes sense, as it reduces the cost of obtaining that knowledge and technology for each participant. Finally, the generic character of the R&D required lends itself to the university setting. Universities are known for taking broader approaches to problems due to their tradition of basic research. Another advantage is that regardless of what issues may arise during the R&D, the larger faculty pool provides a resource from which multidisciplinary teams can be drawn to support the core center staff.

Federal and state agencies also play an important role in stimulating the formation of centers. One of the government's primary motivations for running a centers program is to stimulate job creation and economic prosperity. Often using the enticement of matching funds, agencies seek to stimulate industrial competitiveness by encouraging universities to form centers in the expectation that the centers will increase industry investment in R&D and accelerate the rate of industry adoption of scientific and engineering advances. With mission agencies such as the Department of Defense or NASA, centers also provide a way to leverage government R&D funds dedicated to specific agency needs.

While most centers form around problems associated with industrial competitiveness, this *Directory* demonstrates that environmental and other concerns can motivate formation of centers.

Reasons for Staying Involved With a Center

Center participants in centers expect a flow of benefits to justify their continued affiliation. While there are few studies on how participants measure the benefits they receive, "Evaluation of the NSF Industry/University Cooperative Research Centers: Longitudinal Analysis of Outcome and Process" (Denis Gray, Teresa Gidley, and Nancy Koester, North Carolina State University, December, 1989) and the experience of Foresight Technology, Inc., in helping form and fund centers suggest the following reasons why centers survive.

Four benefits help ensure continued industry support:

1. Enhanced research productivity inside the company
2. Better personnel recruitment
3. Obtaining rights to patents on which proprietary products can be based
4. Commercially successful products based on center-developed knowledge and technology.

Universities point to five benefits in justifying their continued operation of centers:

1. Better student recruitment (especially at the graduate level and in continuing post-graduate education)
2. Better faculty recruitment
3. Increased access to government R&D funds
4. Increased access to private sector funds
5. Increased revenues from patents.

These benefits are seen as causing expansion in the university's research program and enhancement of the knowledge base within the university.

State and Federal Government program managers highlight three benefits when they seek budgets to support centers:

1. Better leverage of scarce R&D funds
2. More rapid transfer of academic knowledge into industry
3. Better U.S. industrial competitiveness.

These benefits result in generation of employment and an improved tax base.

Federal Involvement With Centers

First Centers. The major push for the development of cooperative university/industry environmental R&D centers came from the Federal government. During the late 1960s and the 1970s, the Federal agencies and Congress debated over how the United States could improve the ability of academic research to contribute to industrial technology. A number of initiatives emerged, one of which was the first civilian centers program: the Industry/University Cooperative Research Centers program at the National Science Foundation. Begun in 1978, this program focused on assisting the formation of long-term collaboration between a university and a group of companies.

The Industry/University Cooperative Research Centers program provides the basic model for all Federal centers. The program stimulates the interaction of the university and industrial communities on generic, long-term scientific and engineering research. To ensure that a center's research focus is pertinent to industry, NSF requires matching industrial funds as part of the review process in making awards for Federal support. Further, NSF money is explicitly defined as "seed money." Centers must become self-sufficient within five years of inception as Federal funds are phased out.

While the structure of NSF Industry/University Cooperative Research (I/UCR) Centers varies, there are common elements. Each center has an industrial advisory board made up of companies that directly fund its research. This board sets research priorities and directions. New technology produced at the centers is either jointly owned by the university and the companies on the advisory board or by the university with preferential licensing rights held by the companies.

Today there are 42 I/UCR centers. Four are involved in R&D related to environmental technology: the Center for Hazardous and Toxic Waste Management at the New Jersey Institute of Technology, the Center for Plastics Recycling at Rutgers, the Center for Life Cycle Engineering at the University of Maryland, and the Center for Aseptic Processing at North Carolina State University.

The early success of the NSF program spurred interest in centers. In 1980, Congress enacted two laws which provided a basic framework for Federal programs to stimulate centers. Senator Adlai Stevenson III championed the Stevenson-Wydler Act (P.L. 96-480), which authorized the Secretary of Commerce to establish centers for industrial technology and gave statutory backing for centers at NSF. The Stevenson-Wydler Act also required Commerce and NSF to cooperate with other R&D agencies and authorized those agencies to participate in, contribute to, and serve as resources for centers for industrial technology. Helping ensure that industry could benefit from R&D conducted at centers was the Bayh-Dole Patent Act (P.L. 96-517 1980). This law gave universities the right to patent technologies developed under Federal funding.

Expansion of Federal Centers Programs. The Department of Commerce Centers for Industry Technology authorized by the Stevenson-Wydler Act did not materialize until Congress broadened the mission of the National Bureau of Standards and renamed it the National Institute for Standards and Technology (NIST). At that time, under the leadership of Senator Fritz Hollings, NIST initiated a program of manufacturing technology transfer centers. Despite this fact, Stevenson-Wydler did provide an impetus for more Federal involvement in stimulating the formation of centers.

Established in 1958, NASA was the only agency whose establishing legislation included technology transfer to industry as part of its core mission. NASA served that function by establishing technology transfer offices at each NASA research center

and by establishing Industrial Application Centers (IACs). The IACs are resource centers for industry. They focus on facilitating transfer of existing NASA technologies to industry. NASA's goal for the IACs is to discover secondary applications for existing technology by using NASA's vast technological database to locate technology applicable to problems identified by industrial IAC clients. Most IACs are university based and are funded through fees and the affiliated university in addition to NASA.

In the early 1980s, the Office of Commercial Programs began exploring additional tools for meeting the technology transfer mission. The NSF I/URCs program was one option examined. Based on a favorable review of that program, NASA developed the Centers for the Commercial Development of Space program (CCDS).

CCDSs were designed to get private industry involved in new space technology. Private companies pay membership fees to be on a center's board of directors. This board decides what kind of research will be pursued. To date, there are 16 CCDSs in existence. While industrial support is important, NASA provides more than just seed money for its centers — each one receives approximately $1 million a year in Federal support. Several CCDSs are carrying out environment-related work through their focus on remote sensing.

In the early 1980s, Congress pressured NSF to increase the importance of engineering research within the Foundation. One response, developed in 1985, was the establishment of the Engineering Research Centers (ERC) program. The goal of the ERC program is to bring engineering and scientific disciplines together to address fundamental research issues that are crucial to the next generation of technological advances. The three objectives of this program are to:

1. Establish cross-disciplinary research centers
2. Strengthen the links between university researchers and their industrial counterparts in order to focus research on topics of specific interest to industry
3. Educate students in integrating and managing technological systems.

ERCs are also expected to reach out within the host university and to other academic institutions in their region in order to enhance the overall character of engineering education and research in that area. Because an ERC places greater emphasis on general engineering education and on longer-term basic research than the I/URCs, NSF support is not restricted to seed money. Funding is granted in five-year blocks based on annual NSF reviews. Important for funding renewal is a major review three years after the initial award of five-year funding.

Currently, there are 18 ERCs, with plans to expand that number to 25 in the next few years. Two ERCs are doing environment-related research: the Center for Hazardous Substance Control at the University of California, Los Angeles and the recently established Microbial Contamination Control Center at Montana State University.

The success of NSF centers programs encouraged the Foundation to establish an additional initiative in 1988. Based on the ERC model, the Science and Technology Research Centers (STC) program was established to promote basic research that can most effectively be accomplished through centers. These centers focus on complex research problems that are large scale, long term, and may require special facilities or collaborative relationships across scientific and engineering disciplines. Specific objectives are to:

- Advance research on problems so complex and so resource-intensive that only a financially secure long-term center could produce results
- Reduce the time between actual discovery and utilization of fundamental research results
- Increase U.S. industrial competitiveness.

Accordingly, the core mission of STCs includes ensuring industrial participation in the research and education program and transferring research results to industry. Recognizing, however, that the high-risk, long-term focus of the research conducted by STCs makes it difficult to support centers solely on industrial contributions, NSF anticipates approximately 11 years of Federal support for STCs.

Currently there are 11 centers. NSF anticipates having 30 STCs within a few years. Two centers are conducting research relevant for environmental technology. The Michigan State University Center for Microbial Ecology is looking at the physiology and genetics of micro-organisms and how these organisms affect their ecological surroundings. The University of Oklahoma Center for Analysis and Prediction of Storms is studying major storms, such as thunderstorms, tornados, and flash floods.

The EPA Environmental Research Centers were created in 1979 to provide support to institutions willing to dedicate their efforts for several years to

addressing especially serious or complex environmental problems of concern to EPA. Eight university-based centers were established, and each conducts research in an area named by EPA as a high priority. Support to each center is provided through a cooperative agreement with EPA. Each of the current eight centers is phasing down its operations during the next several months. A new solicitation has been published to establish four new centers, at roughly twice the annual funding as the original centers. Potential topic areas are to be chosen by the proposers. The new centers are expected to be in place by April 1991.

The U.S. Environmental Protection Agency supports five hazardous substance research centers, authorized under section 311(d) of Superfund, as amended in 1986. While the primary focus of these centers is research, each has a training and technology component that comprises approximately 15% of its total budget annually. Each center has a Training and Technology Transfer Advisory Committee, to assist the center director in choosing and monitoring projects. The centers were established in 1989, following a competition. Although each center addresses hazardous substance problems national in scope, each also serves a particular geographic area that corresponds to two contiguous Federal regions. These five centers are described briefly below.

The New Jersey Institute of Technology is the lead institution in a seven-university consortium which serves the New England states, as well as New York, New Jersey, Puerto Rico, and the U.S. Virgin Islands. The primary focus of the research in this center is incineration.

The center which serves the mid-Atlantic and Great Lakes states is headed by the University of Michigan, in partnership with Michigan State University and Howard University. This center focuses its efforts in both research and technology transfer on bioremediation.

The Center for Waste Minimization and Waste Management is led by North Carolina State University, in cooperation with the University of North Carolina and Texas A&M University.

Kansas State University is the lead institution in the consortium which serves the states of the Great Plains and the Great Basin. This large consortium also includes Montana State University and the universities of Iowa, Nebraska, Missouri, Montana, and Utah.

Stanford University and Oregon State University have teamed up to form the Western Region Hazardous Substance Research Center. Groundwater remediation is the primary focus of this center's research program.

Several centers of excellence have been established by the Environmental Protection Agency. In 1988, EPA entered into a Cooperative Agreement with the University of Pittsburgh which established The National Environmental Technology Applications Corporation (NETAC). In contrast to other EPA-funded university/industry centers, NETAC heavily emphasizes assistance with the commercialization of relevant technology. The total EPA commitment to NETAC is $4.5 million over four years. This support from EPA must be matched by support provided through the University of Pittsburgh, including direct industry support and sale of services. NETAC activities include assisting in the evaluation, development, and demonstration of candidate technologies identified in an aggressive outreach program. Technologies are evaluated in terms of their technical feasibility, market potential, and economic impact. NETAC anticipates assisting companies and individuals having highly evaluated technologies with their market research assessments and in obtaining funding for the development and demonstration program. In addition, NETAC research focuses on developing and validating a protocol that rigorously delineates the technology innovation process — from idea/invention through testing, development, manufacture, marketing, and distribution.

The Department of Defense (DOD) has also established centers programs. Because of the character of the DOD mission, the research agenda of these centers is much more influenced by DOD's mission needs than industrial concerns. Government funding is thus the major support for these research programs. However, industry participation and rapid transfer of results to industry also are important components.

Key Traits of Successful Centers. Federal managers of centers programs have identified similar traits as responsible for center success. For example, John Owens of the I/URC program at NSF says the ingredients for success of an IUC are strong leadership, good planning, and pertinence of research topics to industry. A core of research that is varied rather than specific is of prime importance. Pitfalls to avoid include lapsing into the old-

fashioned "contract mode," where a single company initiates research.

Lynn Preston of NSF's ERC program also emphasizes strong leadership, well- integrated research relevant to industry, and quality strategic planning. Preston notes that the two ERCs which have closed suffered from poor leadership and too much individualism by university scientists. The traditional academic tendency to section off one's own research as an island does *not* work at an ERC. University and industry researchers must work together with ERC leaders to make the system work.

Ana Villamil, the commercial space opportunity manager in charge of the NASA CCDS program, is another manager who stresses industrial relevance of the research agenda. She notes the research agenda must be directed by industry for a CCDS to succeed. Center leadership is important for CCDSs also. Seeking reliance on NASA management for leadership leads to overcentralization and micromanagement; therefore, NASA is careful to encourage development of appropriate management structures in their CCDSs.

These insights are confirmed in a recently completed study by Eliezer Gleisler, Antonio Furno, and Thomas Kiresuk. In "Toward a Conceptual Model of Cooperative Research: Patterns of Development and Success in University-Industry Alliances" (unpublished manuscript), they conclude that the traits of successful centers fall into four categories: management, relations with industry, research activities and funding.

Important management traits

- Reputation of center leadership
- Well defined goals and objectives
- Planned leadership succession
- Ability to attract and retain quality researchers
- Planned intervention for leadership burnout
- Strong commitment of research staff and administration

Key traits in relations with industry

- Continuous marketing and other contacts with industry
- Ability to understand industrial R&D culture
- Industrial commitment to joint research
- Extensive interactions with industrial researchers
- Agreeable modes for transfer of knowledge and technology

Core traits for research activities

- Balance between short- and long-term projects
- Maintenance of cutting edge research activities
- Program of conferences, symposia, publication and instruction
- Maintenance of high scientific/technical reputation

Vital funding traits

- Ability to obtain support from multiple sources
- Strong institutional support from university and industry
- Ability to attract funding for long-term support

Linking and Sharing Experiences Among Centers

As the number and diversity of centers expand, participants from academia, industry, and government have begun asking how centers can better cooperate and share lessons learned about management, technology transfer, and fundraising.

Established first, the NSF I/URC program has served as a model for government efforts to encourage links among centers. Three mechanisms are used: monitoring and evaluation, meetings for key personnel, and supplemental funding to encourage linkages. These mechanisms can also be found in other Federal and state government centers programs.

Early in the I/URC program, a decision was made to fund evaluation of individual centers by an in-house monitor, as well as to support studies examining the program as a whole. Program-wide studies were originally conducted by NSF staff. Their work resulted in numerous reports, including several "cookbooks" on how to establish a center on the I/URC model and how to structure agreements between industry and the university. The program-wide monitoring and evaluation function is currently conducted under an award to North Carolina State University.

Meetings provide an opportunity for key center personnel to explore common interests. The I/URC program sponsors annual and semiannual meetings, where center directors and monitors may share information and form new linkages.

Another option for encouraging linkages was added more recently to the I/URC program. NSF allows centers to compete for additional funding for linking one or more research projects among centers.

Directory of Cooperative University and Industry Environmental Research and Development Centers

This section contains information on 114 university and industry environmental research and development centers. The centers are listed alphabetically by the name of the foundation or university. In cases where a center is made up of a consortium of universities, the center is listed alphabetically according to the name of the first university listed. Information is provided in seven categories following a brief summary: size and scope, sources of funding, services provided, major projects in fiscal year dollars, technology transfer mechanisms/ outreach programs, networking activities, and history. If information for a particular category was not available that category was omitted.

Alabama, University of (Huntsville)

Kenneth E. Johnson Research Center
Huntsville, AL 35899

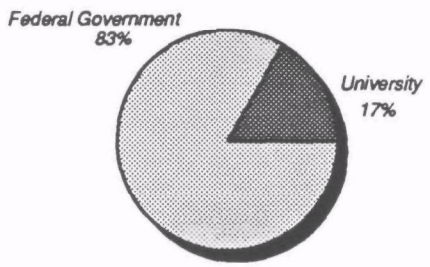
University of Alabama in Huntsville's Kenneth E. Johnson Research Center focuses its research in the fields of solar energy, atmospheric studies, electric vehicles, environmental life support for enclosed areas, recycling and waste management. The center operates the Alabama Solar Energy Center and the Alabama Educational Research and Development Network.

Director: Bernard J. Schroer
Phone: (205)895-6361

Size and Scope

Number of Personnel:	150	FTEs:	30
Technical:	25	Administrative:	5
Background: PhDs:	20	MSs:	5
BSs:	5		

Sources of Funding for FY89



University: University of Alabama . . . $500,000
Federal Government $2,500,000

Services Provided

Major Areas of Expertise

- Solar energy
- Atmospheric studies
- Electric vehicles
- Environmental life support for enclosed areas
- Recycling
- Waste management

Current Activity Mix

• Basic Research	20%
• Applied Research	80%
Prototype Development	

Major Projects in FY89

1. Atmospheric Studies
2. Environmental Life Support and Materials Research for Space Station
3. Materials Processing in Low Gravity
4. Electric Vehicles
5. Municipal Recycling (Steam Plant Disposal)

Technology Transfer Mechanisms/ Outreach Programs

Annual Report: January

Networking Activities

Current Affiliations

- Alabama Solar Energy Center
- Colorado State University
- University of Alabama
- Georgia Institute of Technology
- University of Florida
- North Carolina State University

International Affiliations

- Chisolm Institute, Australia
- University of Aachen, West Germany

History

Date Founded: 1971
Founders: State of Alabama
Reasons for Founding: To study atmosphere-related environmental issues

Alaska, University of (Fairbanks)

Geophysical Institute
C.T. Elvey Building
Fairbanks, AK 99775-0800

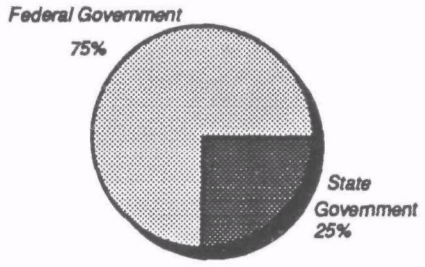
University of Alaska, Fairbanks Geophysical Institute concentrates its research on the quantitative understanding of basic physical processes governing our planet, especially as they affect the State of Alaska and the Arctic. The institute maintains several specialized facilities for rocket launches, ground observations, transmissions and seismic monitoring.

Director: Syun-Ichi Akasofu
Phone: (907)474-7282

Size and Scope

Number of Personnel:	270	FTEs:	220
Technical:	264	Administrative:	6
Background: PhDs:	70	MSs:	50

Sources of Funding for FY89



Federal Government: U.S. Geological Survey; NSF; DOE; USAF $9,000,000
State Government $3,000,000

Services Provided

Major Areas of Expertise

- Space physics
- Atmospheric sciences
- Ice physics
- Solid earth physics
- Seismology
- Volcanology

Current Activity Mix

- Basic Research 90%
- Applied Research 10%
- Unique Specialties: Institute operates Poker Flat Rocket Range

Major Projects in FY89

1. Synthetic Aperture Radar (SAR) Research
2. Rocket Research
3. Volcanic Monitoring of Redoubt Volcano

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	2
Annual Report:	Biennial
Courses Offered in 1989:	15

Networking Activities

Current Affiliations

- U.S. Geological Survey
- NASA

International Affiliations

- Hokaido University, Sapporo, Japan
- Moscow University, Moscow, U.S.S.R.
- Polar Geophysical Institute, Murmansk, U.S.S.R.

History

Date Founded: 1946
Founders: U.S. Congress

Alaska, University of (Fairbanks)

Water Research Center
Fairbanks, AK 99775 1760

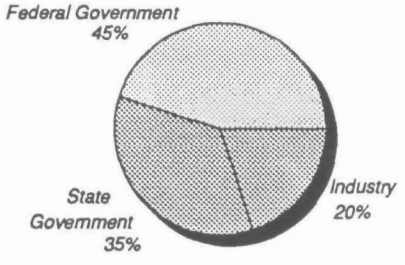
The University of Alaska's Water Research Center conducts research on water quality, hydrology, limnology and oil cleanup. The center's location gives it a unique opportunity to study global warming.

Director: Douglas Kane
Phone: (907)474-7808

Size and Scope

Number of Personnel:	30	FTEs:	10
Technical:	28	Administrative:	2
Background: PhDs:	10		

Sources of Funding for FY89



Federal Government: NASA; DOE; NOAA; U.S.Geological Survey; U.S. Fish & Wildlife Service $495,000
State Government: Department of Transportation; Natural Resources; Environmental Conservation $385,000
Industry: Exxon $220,000

Services Provided

Major Areas of Expertise

- Fresh water research
- Water quality hydrology
- Hydrology
- Limnology
- Oil spill cleanup

Current Activity Mix

- Basic Research 20%
- Applied Research 80%

Major Projects in FY89

1. Prince William Sound Biodegradation of Oil Spill
2. Biological Methods for Beach Cleaning
3. Alaskan North Slope Ecological Study (hydrology)
4. The Use of Peat Mounds for Treatment of Household Waste Water

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1

Networking Activities

Current Affiliations

- Ohio State University
- San Diego State University
- University of Colorado

International Affiliations

- Institute for Low Temperature Science, University of Japan, Sapporo, Japan

History

Date Founded: 1965
Founders: University of Alaska
Reasons for Founding: U.S. Legislation provided funding for research on the area of water quality.

Arizona State University

Center for Environmental Studies
Tempe, AZ 85287 5506

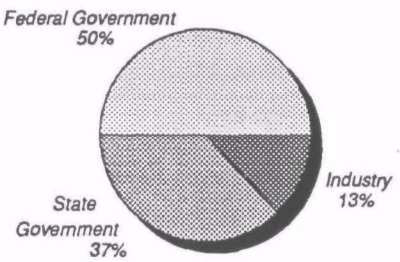
The Center for Environmental Studies at Arizona State University concentrates its research in the areas of the ecosystem, aquatic environments, reclamation, and land use. The center has particular expertise in siting waste deposits and transporting hazardous wastes.

Director: Duncan T. Patten
Phone: (602)965-2975

Size and Scope

Number of Personnel:	17	FTEs:	16
Technical:	15	Administrative:	2
Background: PhDs:	9	MSs:	4
BSs:	2		

Sources of Funding for FY89



Federal Government: USDA; EPA; DOI; U.S. Fish and Wildlife Service $350,000
State Government $259,000
Industry: Southern California Edison; Los Angeles Water and Power $91,000

Services Provided

Major Areas of Expertise

- Ecosystem studies
- Aquatic studies
- Wild life studies
- Reclamation research; risk and technology assessment; impact assessment; environmental regulation and policy

Current Activity Mix

- Applied Research 100%
- Unique Specialties: Project on hazardous materials management (siting waste deposits and transportation of hazardous materials); Wetlands and riparian ecology and ecosystems expressed as mathematical models

Major Projects in FY89

1. Taste Aversion Study on Coyotes (for USDA, Animal Control Division)
2. Riparian Ecology in the Eastern Sierras
3. Study of Endangered Fish Species (for Fish and Wildlife Service)
4. Airborne Emissions Affecting Vegetation
5. Glen Canyon Environmental Study

Technology Transfer Mechanisms/ Outreach Programs

Other: 1- to 2-day hazardous management seminars on RCRA regulations

History

Date Founded: 1974
Founders: Duncan Patten; Mel Marcus
Reasons for Founding: To respond to the need to provide environmental research and education

Arizona State University

Forestry Sciences Laboratory
Tempe, AZ 85287

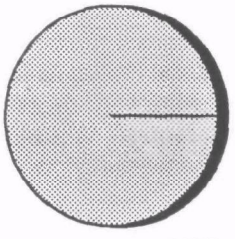
Arizona State University's Forestry Sciences Laboratory specializes in watershed research (erosion, water quality, soils) and range and wildlife management (including endangered species protection). The laboratory is closely affiliated with the Rocky Mountain Forest and Range Experiment Station.

Director: Leonard F. Debano
Phone: (602)379-4365

Size and Scope

Number of Personnel:	35	FTEs:	32
Technical:	30	Administrative:	5
Background: PhDs:	28	MSs:	2

Sources of Funding for FY89



Federal Government: U.S. Forest Service;
USDA $1,250,000

Services Provided

Major Areas of Expertise

- Watershed research (erosion, water quality, soils)
- Range and wildlife management

Current Activity Mix

- Basic Research 10%
- Applied Research 90%
- Products or Processes Commercialized
- Unique Specialties: Protecting endangered species (Bald Eagle and Spotted Owl)

Major Projects in FY89

1. Watershed Management Project
2. Riperian Hydrology Studies
3. Endangered Species Protection (Bald Eagle, Spotted Owl)

Technology Transfer Mechanisms/ Outreach Programs

Annual Report: April

Networking Activities

Current Affiliations

- U.S. Forest Service
- USDA
- Rocky Mountain Forest and Range Experiment Station

History

Date Founded: 1961
Reasons for Founding: To research soil and wildlife conservation

Arizona, University of

Engineering Experiment Station
Civil Engineering Building
Room 303
Tucson, AZ 85721

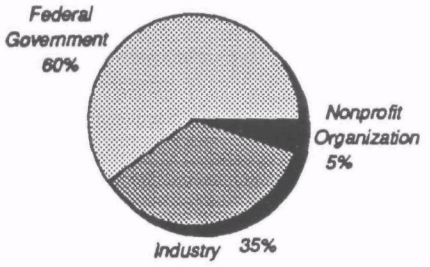
University of Arizona's Engineering Experiment Station conducts research in controlled-environment agriculture for intensive food production; in seawater crop irrigation; and in solar heating and cooling. The station then applies this research and technology to prototype systems for future cities. The laboratory's current major project is biosphere II, a sealed, self-sustaining, two-acre mini-Earth with five distinct ecosystems.

Director: Peter F. Mather
Phone: (602)621-7492

Size and Scope

Number of Personnel:	430	FTEs:	430
Technical:	406	Administrative:	24
Background: PhDs:	130		

Sources of Funding for FY89



Federal Government: NASA; NSF; NIH; DOD; DOE; EPA; NRC; DOC $6,600,000
Industry: IBM $3,850,000
Nonprofit Organization: American Steel Construction Institute; Petroleum Research Foundation . $550,000

Services Provided

Major Areas of Expertise

- Electronic packaging
- Fluid dynamics
- Materials sciences
- Superconductivity
- Water quality
- Water treatment hydrology

Current Activity Mix

- Basic Research 90%
- Applied Research 10%
- Products or Processes Commercialized: Gifts software
- Unique Specialties: Triga nuclear reactor research

Major Projects in FY89

1. Microcontamination Control
2. Low Gravity Separation Research
3. Utilization of Planetary Resources
4. Biosphere II: A Mini-Earth Experiment
5. Nuclear Waste Management and Disposal

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 21
Annual Report: Biennial
Patents Issued in the Last 3 Years: 3
Other: Office of Engineering and Professional Development

Networking Activities

Current Affiliations

- University of Arizona, Center for Microcontamination Control;
- NASA Center for Utilization of Local Planetary Resources
- NASA Center for Low Gravity Seperation Sciences

International Affiliations

- U.S. AID Programs in: Senegal, Australia, Zaire, Guinea, Egypt

History

Date Founded: 1941
Founders: University of Arizona
Reasons for Founding: Legislation passed during World War II

Arkansas, University of (Little Rock)

Graduate Institute of Technology
2801 South University Avenue
Little Rock, AR 72204

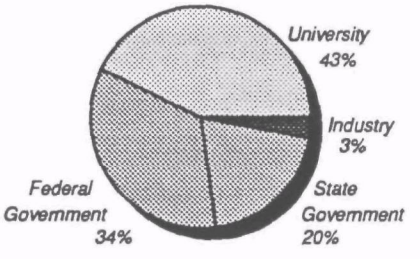
University of Arkansas at Little Rock's Graduate Institute of Technology conducts a wide variety of research in the environmental sciences. Recent projects have included measuring the aerodynamics of microparticles, detecting neutrino-gamma rays, characterizing and evaluating aerosols, and controlling solid hazardous waste and wastewater. In addition the institute provides product development and technology transfer services.

Director: Gaylord Northrop
Phone: (501)569-8211

Size and Scope

Number of Personnel:	50	FTEs:	20
Technical:	44	Administrative:	6
Background: PhDs:	12	MSs:	8

Sources of Funding for FY89



University: University of Arkansas, Little Rock $1,500,000
Federal Government $1,200,000
State Government $700,000
Industry $100,000

Services Provided

Major Areas of Expertise

- Particle characterization instrumentation
- Artificial intelligence
- Laser research
- Biotechnology
- Applied statistics
- Processing control and instrumentation

Current Activity Mix

- Basic Research 25%
- Applied Research 75%
- Products or Processes Commercialized: E-Spart

Major Projects in FY89

1. E-Spart: To Measure Aerodynamics of Microparticles
2. LaserAim: To Place Laser Spot on Targets
3. Artificial Intelligence Research
4. Neutrino - Gamma Ray Detection Research
5. Biomedical Technology and Instrumentation

Technology Transfer Mechanisms/ Outreach Programs

Patents Issued in the Last 3 Years: 1

Networking Activities

Current Affiliations

- National Center for Toxicology Research
- University ofArkansas Medical Center
- McClellan Veterans Administration Hospital

International Affiliations

- Hosakowa International, Japan
- Toshiba Corporation, Japan

History

Date Founded: 1957

Founders: State of Arkansas

Reasons for Founding: To provide graduate science and technology education in central Arkansas

Auburn University

International Center for Aquaculture
Department of Fisheries and Allied Aquaculture
Swingle Hall
Auburn, AL 36849 5419

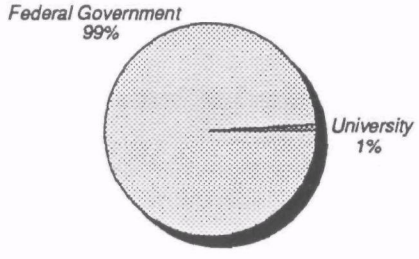
Auburn University's International Center for Aquaculture, an integral unit of Alabama's Agricultural Experiment Station, provides technical assistance to developing countries in their development of inland fisheries and aquaculture. The center conducts research, training and extension programs in numerous aspects of fish cultivation, inventory, taxonomy, nutrition and feeding, diseases, weed control, pollution control, technology, processing and preservation.

Director: Bryan Duncan
Phone: (205)844-4786

Size and Scope

Number of Personnel:	11	FTEs:	9
Technical:	8	Administrative:	1
Background: PhDs:	9	MSs:	2

Sources of Funding for FY89



University: Auburn University $10,000
Federal Government: USAID $990,000

Services Provided

Major Areas of Expertise

- Aquaculture research and development; technology transfer and training

Current Activity Mix

- Applied Research 100%
  - Prototype Development
  - Market Assessment

Major Projects in FY89

1. Pond Dynamics Collaborative Research Support Program
2. Fisheries Research and Development Project (with Indonesia)
3. Western Universities Project - Aquaculture Curriculum Development
4. National Fish Culture Project (in Rwanda)

Technology Transfer Mechanisms/ Outreach Programs

Courses Offered in 1989: 1
Other: Short courses offered on request

Networking Activities

Current Affiliations

- University of Rhode Island
- University of Kentucky
- University of Arkansas, Pine Bluff
- University of Hawaii

International Affiliations

- University of Riau, Pekenbau, Indonesia
- National University of Rwanda, Butare, Rwanda
- Universitas Hassanudin, Ujung Pandag, Indonesia
- Universidad San Carlos, Guatemala City, Guatemala

History

Date Founded: 1970
Founders: Auburn University; USAID
Reasons for Founding: To further international aquaculture

Auburn University

Water Resources Research Institute
202 Harris Hall
Auburn, AL 36849

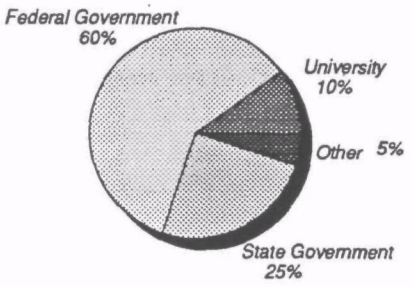
Auburn University's Water Resources Research Institute is an interdisciplinary, problem-oriented research and technology center designed to address broad national needs and relevant industrial technology. The institute's program objectives include extending and intensifying water resources research in all of Alabama's major universities by widening the participation of individual researchers and disciplinary fields involved.

Director: J.F. Judkins
Phone: (205)844-5075

Size and Scope

Number of Personnel:	4	FTEs:	4
Technical:	1	Administrative:	3
Background: PhDs:	1		
BSs:	3		

Sources of Funding for FY88



University: Auburn University	$120,000
Federal Government: DOI; EPA; DOD; DOE	$720,000
State Government: Alabama Department of Environmental Management; Alabama Geological Survey	$300,000
Other: City of Auburn	$600,000

Services Provided

Major Areas of Expertise

- Water resources; aquatic weed control; ground water control; fisheries management

Current Activity Mix

• Basic Research	75%
• Applied Research	25%
Market Assessment	

Major Projects in FY89

1. Privatization of Waste Water Treatment Plants
2. Effect of Saltwater Intrusion on Soil Erodibility
3. Permeability Changes in Clay and Chalf Flow Barriers Caused by Hazardous Wastes
4. Water Resources Technology Information Transfer

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	2
Annual Report:	December

Networking Activities

Current Affiliations

- National Association of Water Institute Directors (NAWID)
- University Council on Water Resources
- American Water Resources Association

History

Date Founded: 1964
Founders: Auburn University
Reasons for Founding: Concerns with state, regional and national water resource problems

Brigham Young University

Advanced Combustion Engineering Research Center
270 Clyde Building
Provo, UT 84602

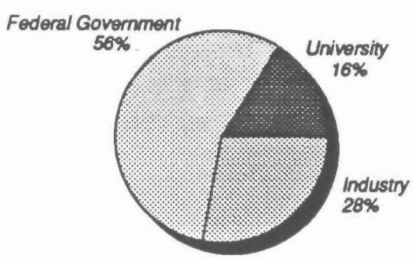
Brigham Young University's Advanced Combustion Engineering Research Center is geared toward enhancing the U.S. competitive position in clean and efficient use of fossil fuels, through research, education and technology transfer. Current research focuses on using computer-generated simulations to design and develop cleaner and more efficient combustion systems for burning coal and for incinerating solid-waste products.

Director: L.D. Smoot
Phone: (801)378-4326

Size and Scope

Number of Personnel:	91	FTEs:	42
Technical:	90	Administrative:	1
Background: PhDs:	30	MSs:	30

Sources of Funding for FY89



University: Brigham Young University . .	$520,000
Federal Government: NSF	$1,800,000
Industry: Advanced Fuel	$900,000

Services Provided

Major Areas of Expertise

- Combustion
- Catalysis
- Thermo-chemistry
- Signal processing
- Computer aided engineering design and manufacture

Current Activity Mix

• Basic Research	90%
• Applied Research	10%

Major Projects in FY89

1. Radiation in Combustion Systems
2. Hazardous Waste Destruction During Thermal Incineration
3. Chemical Characteristics of Coal and its Combustion Products
4. Incineration of Unconventional Fuels
5. Hazardous Waste Submodel Evaluation

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	12
Annual Report:	February
Courses Offered in 1989:	20

Networking Activities

Current Affiliations

- University of Utah
- Advanced Combustion Engineering Research Center Advisory Council and Associates/Affiliates Committee

History

Date Founded: 1986
Founders: Brigham Young University; University of Utah; NSF, Division of Cross Disciplinary Research
Reasons for Founding: To keep U.S. industry abreast of current technology

California, University of

Bodega Marine Laboratory
P.O. Box 247
Bodega Bay, CA 94923

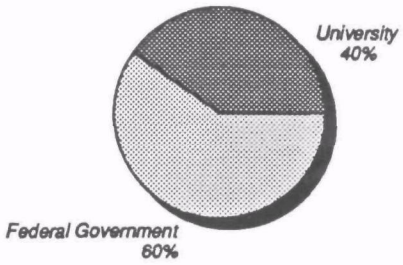
University of California's Bodega Marine Laboratory, administered by the Davis Campus, is distinguished by a remarkably diverse array of coastal habitats available for study. Intertidal habitats (sandy beaches, salt marshes, small estuaries, tidepools, mud and sandflats), terrestrial habitats (dune-strand areas, coastal prairie, riparian woodland, and freshwater marshes), marinas, bays and the ocean are all nearby.

Director: James. S. Clegg
Phone: (707)875-2211

Size and Scope

Number of Personnel:	75	FTEs:	25
Technical:	25	Administrative:	10
Background: PhDs:	20	MSs:	5

Sources of Funding for FY89



University: University of California . . . $2,070,000
Federal Government: NOAA; NSF; USDA . $3,080,000

Services Provided

Major Areas of Expertise

- Aquaculture; oyster research; local comparative biochemistry

Current Activity Mix

- Basic Research 90%
- Applied Research 10%

Major Projects in FY89

1. Shore Bird Biology
2. Population Genetics
3. Population Biology of Sharks
4. Bioassay Research
5. Endocrine Control Research

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1

Networking Activities

Current Affiliations

- Scripps Institute of Oceanography, La Jolla, CA.; other University of California campuses

History

Date Founded: 1961
Founders: National Science Foundation
Reasons for Founding: To further marine research and instruction

California, University of

Lawrence Livermore National Laboratory
P.O. Box 808
Livermore, CA 94550

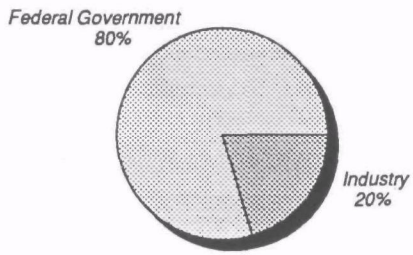
University of California's Lawrence Livermore National Laboratory conducts six major programs: weapons studies; magnetic fusion energy; laser isotope separation; laser fusion energy; energy and resources; resources and biomedical, environmental and atmospheric sciences. Researchers explore the effects of toxic substances on genetic and reproductive systems and assess the risk associated with the release of contaminants into the environment.

Director: John Nuckolls
Phone: (415)422-1100

Size and Scope

Number of Personnel: 8492 FTEs: 8492
Technical: 6364 Administrative: 2128
Background: PhDs: 1285

Sources of Funding for FY89



Federal Government: DOE; DOD; NASA; EPA; USDA $839,600,000
Industry $216,000,000

Services Provided

Major Areas of Expertise

- Defense systems; laser research; magnetic fusion energy; biomedical sciences; materials science; environmental science

Current Activity Mix

- Basic Research
- Applied Research
  - Prototype Development
  - Market Assessment
- Products or Processes Commercialized: Monoclonial antibodies; computer chips; computer software

Major Projects in FY89

1. Modeling of Global Atmospheric Sulphur Cycle: The Origin of Cloud Condensation Nuclei of the North Atlantic
2. Testing Effects of Ocean Heat Transport on Climate
3. Deposition and Global Reactive Nitrogen Cycle

Technology Transfer Mechanisms/ Outreach Programs

Annual Report: Summer

Networking Activities

Current Affiliations

- Los Alamos National Laboratory
- All other national laboratories
- University of California, Davis; DOE

History

Date Founded: 1952
Founders: E.O. Lawrence
Reasons for Founding: Research and development on nuclear weapons, energy and national security problems

California, University of (Berkeley)

Sanitary Engineering & Environmental Health Research Laboratory
1301 S. 46th Street
Building 112 RFS
Richmond, CA 94804 4603

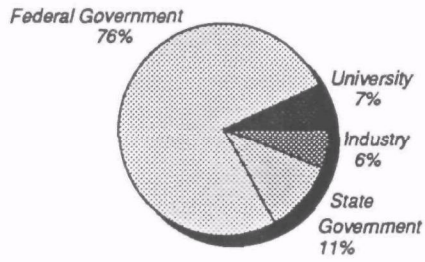
University of California, Berkeley's Sanitary Engineering and Environmental Health Research Laboratory was established to facilitate interdisciplinary research in a wide range of environmental health fields: sanitary engineering, waste water treatment, limnology, reclamation and reuse, drinking water quality and abatement of hazardous wastes. The laboratory maintains a secondary wastewater treatment plant and an estuarine water system.

Director: Robert C. Cooper
Phone: (415)231-9474

Size and Scope

Number of Personnel:	49	FTEs:	14
Technical:	42	Administrative:	7
Background: PhDs:	15	MSs:	27

Sources of Funding for FY89



University: University of California, Berkeley $140,000
Federal Government: National Institute for Environmental Health; NSF; EPA; NIH; DOE . . . $1,520,000
State Government: California Health Services Department; California State Water Resource Control Board $220,000
Industry: Exxon; Procter & Gamble; Chemical Manufacturers Association. $120,000

Services Provided

Major Areas of Expertise

- Sanitary engineering
- Waste water treatment
- Algology
- Limnology
- Reclamation and reuse
- Drinking water quality
- Abatement of hazardous wastes

Current Activity Mix

- Basic Research 50%
- Applied Research 50%
  Prototype Development

Major Projects in FY89

1. Shallow Water Cohesive Sediment Dynamics in Estuarine Systems
2. Ecological Effects and Management of Selenium Toxicity in Kesterson Marsh, California Central Valley
3. Transport and Cleanup of Mixed Liquid Wastes Trapped in Soil
4. Environmental Aspects of the Development of Synthetic Fuels
5. Development and Testing of Model of Iron Phosphate Precipitation in Activated Sludge

Networking Activities

Current Affiliations

- California State Health Department

History

Date Founded: 1950
Founders: State Legislature and UC Berkeley
Reasons for Founding: To study a wide range of environmental health fields

California, University of (Davis)

Crocker Nuclear Laboratory
Davis, CA 95616

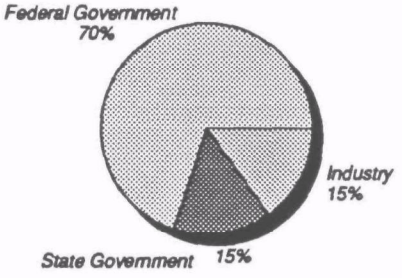
University of California, Davis' Crocker Nuclear Laboratory supports research in many disciplines, including biology, engineering, environmental and food sciences, geology, history, medicine, physics and textiles. The air quality group studies aerosols, sampler design and elemental analysis; air quality and visibility in remote national parks; and interplanetary dust fall.

Director: Thomas A. Cahill
Phone: (916)752-4674

Size and Scope

Number of Personnel:	32	FTEs:	24
Technical:	29	Administrative:	3
Background: PhDs:	6	MSs:	4
BSs:	8		

Sources of Funding for FY89



Federal Government: EPA; National Park Service; U.S. Forest Service; Bureau of Land Management; Fish and Wildlife Service $1,050,000
State Government $225,000
Industry $225,000

Services Provided

Major Areas of Expertise
- Atmospheric Sampling; Analysis and Interpretation

Current Activity Mix
- Basic Research 30%
- Applied Research 70%
- Unique Specialties: Operates 60 air sampling stations nationally

Major Projects in FY89

1. Interagency Monitoring of Projected Visual Environments (IMPROVE)
2. Northeast State Coordinated Air Use Management (NESCAUM)
3. South Coast Air Quality Study (SCAQUS)
4. Area Sources Board Sequoia Study (ASBSS)
5. National Park Service Criteria Network (NPSCN)

Networking Activities

Current Affiliations
- National Park Service Criteria Network (NPSCN)

International Affiliations
- University of Chile-Convenio, Santiago, Chile

History

Date Founded: 1970
Founders: T. Cahill; R. Flocchini; P. Feeney
Reasons for Founding: Application of modern nuclear techniques to improve air quality

California, University of (Los Angeles)

Engineering Research Center for Hazardous Substances Control
6722 Boelter Hall
Los Angeles, CA 90024

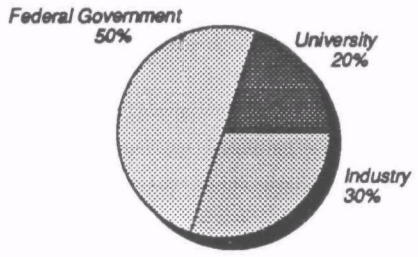
The University of California, Los Angeles' Engineering Research Center for Hazardous Substances Control centers its research efforts on waste minimization, waste treatment, education, and technology transfer. Through its Industry Affiliates Program, the center develops direct working relationships with the industrial and government laboratory sector.

Director: S.K. Friedlander
Phone: (213)206-3071

Size and Scope

Number of Personnel:	59	FTEs:	45
Technical:	54	Administrative:	5
Background: PhDs:	14	MSs:	30

Sources of Funding for FY89



University: University of California, Los Angeles $600,000
Federal Government: NSF $1,500,000
Industry: IBM; Mobil; Chevron; General Motors $900,000

Services Provided

Major Areas of Expertise

- Waste minimization
- Thermal treatment of hazardous wastes
- Hazardous waste water treatment

Current Activity Mix

- Basic Research 80%
- Applied Research 20%
  - Prototype Development
  - Market Assessment

Major Projects in FY89

1. Resident Incineration
2. Development of New Enzyme Technologies to Degrade Hazardous Waste Water
3. Expert Systems for Incinerators

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 8
Other: University of California, Los Angeles Extension Service Workshops

Networking Activities

International Affiliations

- Elf Aquitaen, Paris, France

History

Date Founded: 1987
Founders: University of California, Los Angeles
Reasons for Founding: NSF grant proposal

California, University of (Los Angeles)

National Center for Intermedia Transport Research
5531 Boelter Hall
Department of Chemical Engineering
Los Angeles, CA 90024 1592

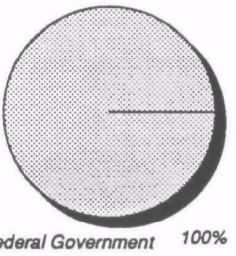
The National Center for Intermedia Transport Research at the University of California concentrates its research on pollutant transport and transformation. The center sponsors work on problems of pollutant exchange between environmental media. The center also operates its own air quality laboratory.

Director: Yoram Cohen
Phone: (213)825-9741

Size and Scope

Number of Personnel:	8	FTEs:	8
Technical:	7	Administrative:	1
Background: PhDs:	7		
BSs:	1		

Sources of Funding for FY89



Federal Government: EPA $540,000

Services Provided

Major Areas of Expertise

- Multimedia and intermedia transport research
- Pollutant exchange between media
- Process research

Current Activity Mix

- Basic Research 10%
- Applied Research 90%
- Products or Processes Commercialized: Spatial multimedia compartmental model software
- Unique Specialties: Intermedia and multimedia environmental research; air quality laboratory

Major Projects in FY89

1. Study of Transport and Transformations of Aerosols
2. Spatial Multimedia Compartmental Model (SMCM) software
3. Pesticide Risk Assessment Study
4. Role of Hydrogen Peroxide and Ozone in Sulfuric Acid Formation
5. Tracking of Non-Aqueous Phase Liquids

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 4

Networking Activities

Current Affiliations

- EPA Centers of Excellence

History

Date Founded: 1980
Founders: EPA; University of California, Los Angeles
Reasons for Founding: To create an EPA environmental research center at the University of California, Los Angeles

California, University of (Riverside)

California Water Resources Center
Rubidoux Hall
4501 Glenwood Street
Riverside, CA 92501

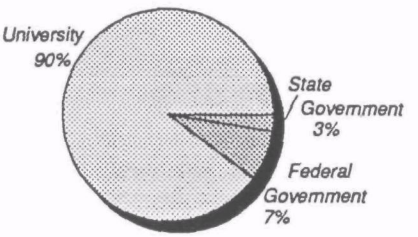
The California Water Resources Center at the University of California, Riverside, sponsors water resources research on all campuses of the University of California, and at other universities around the state. The center's scope of research includes all aspects of the hydrologic cycle with emphasis on fresh waters, inland saline water and estuaries.

Director: Henry J. Vaux, Jr.
Phone: (714)787-4327

Size and Scope

Number of Personnel:	13	FTEs:	11
Technical:	5	Administrative:	8
Background: PhDs:	3	MSs:	2

Sources of Funding for FY89



University: University of California, Riverside $1,260,000
Federal Government $105,000
State Government $35,000

Services Provided

Major Areas of Expertise

- Stimulation and coordination of water resources research on the 9 University of California campuses

Current Activity Mix

- Basic Research 80%
- Applied Research 20%

Major Projects in FY89

1. Hydrology and Climatology Surveys
2. Aquatic Ecosystem Studies
3. Water Quality Research
4. Evaluating the Institutional Aspects of Water
5. Water Policy and Water Law

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 3
Annual Report: December

Networking Activities

Current Affiliations

- University of California's 9 campuses
- 54 U.S. Water Resource Centers (of the National Association of Water Institute Directors)

International Affiliations

- U.S./Mexico Border Study of Waste Water Treatment and Disposal Alternatives
- On-Line Computer Library Center (OCLC) - 3500 Libraries Worldwide

History

Date Founded: 1957
Founders: California Legislature Special Act
Reasons for Founding: State funded program to advise on water projects

California, University of (Riverside)

Statewide Air Pollution Research Center
Riverside, CA 92521

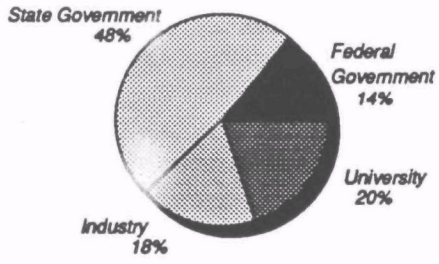
University of California, Riverside's Statewide Air Pollution Research Center concentrates its research on plant sciences and atmospheric chemistry, bridging the academic world and the practical world of air pollution control. Programs in atmospheric chemistry make use of infrared, visible and ultraviolet spectroscopy, chromatography and mass spectrometry, and computer modeling to simulate atmospheric conditions in a unique set of environmental chambers.

Director: Cliff Taylor (Acting)
Phone: (714)787-4584

Size and Scope

Number of Personnel:	43	FTEs:	43
Technical:	36	Administrative:	7
Background: PhDs:	11	MSs:	2

Sources of Funding for FY89



University: University of California, Riverside	$762,347
Federal Government: EPA; NSF	$549,854
State Government: California Air Resources Board	$1,826,055
Industry: Southern California Edison; Ford Motor; EPRI	$691,072

Services Provided

Major Areas of Expertise

- Air quality assessment
- Crop loss assessment
- Plant sciences
- Atmospheric chemistry

Current Activity Mix

• Basic Research	25%
• Applied Research	75%

Major Projects in FY89

1. Atmospheric Chemistry of Polycyclic Hydrocarbons
2. Effects of Acid Fog and Ozone on Conifers
3. Effects of Gaseous Air Pollutants on Vegetation
4. Lifetimes and Fates of Toxic Air Contaminents in California's Atmosphere
5. Hydrocarbon Emissions from Vegetation Found in California's Central Valley

History

Date Founded: 1961
Founders: University of California, Riverside
Reasons for Founding: To monitor pollution effects on California vegetables

California, University of (Riverside, Davis, Berkeley)

Agricultural Experiment Station
300 Lakeside Drive
Oakland, CA 94612 3560

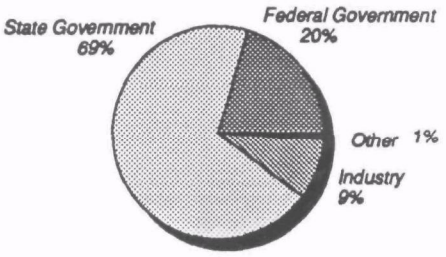
University of California's Agricultural Experiment Stations at Riverside, Davis and Berkeley permit interdisciplinary research in biochemistry, biology, biomedical sciences, botany and plant sciences, chemistry, earth sciences, entomology, geophysics and planetary physics, mathematics, nematology, physics, plant pathology, soils and environmental sciences, and statistics. The stations emphasize nutrition, fertilization, irrigation, cultivation, pest control, disease resistance and troubleshooting of potentially disastrous agricultural problems.

Director: Kenneth Farrell
Phone: (415)987-0060

Size and Scope

Number of Personnel:	2403	FTEs:	2403
Technical:	1953	Administrative:	450
Background: PhDs:	553		

Sources of Funding for FY89



Federal Government: NSF; NIH; DOE;	$26,000,000
State Government	$88,000,000
Industry	$12,000,000
Other: Product Sales	$1,000,000

Services Provided

Major Areas of Expertise

- Agricultural production
- Environmental horticulture and toxicology
- Botany
- Entomology
- Forestry
- Plant pathology
- Genetics
- Microbiology

Current Activity Mix

- Basic Research
- Applied Research
  Prototype Development
- Products or Processes Commercialized: New Strawberry Varieties

Major Projects in FY89

1. Integrated Pest Management
2. California's Great Central Valley in the 21st Century
3. Integrated Hardwood Range Management
4. Genetic Alteration Employing Somatic Cell Fusion Techniques

Technology Transfer Mechanisms/ Outreach Programs

Patents Issued in the Last 3 Years: 15
Other: Cooperative extension service

Networking Activities

Current Affiliations

- California State Department of Food and Agriculture
- USDA
- EPA

International Affiliations

- Province of Catalonia, Barcelona, Spain
- Center for Rice Research, Philipines
- World Bank, Washington, DC

History

Date Founded: 1868
Founders: University of California
Reasons for Founding: To meet the provisions of the Hatch Act

Carnegie Mellon University

Bushy Run Research Center
RD #4, Mellon Road
Export, PA 15632

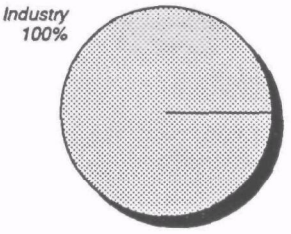
Carnegie Mellon University's Bushy Run Research Center conducts research on animal toxicology. The center is a pioneer in the application of toxicologic test methods.

Director: Fred R. Frank
Phone: (412)733-5222

Size and Scope

Number of Personnel:	100	FTEs:	100
Technical:	80	Administrative:	20
Background: PhDs:	29		

Sources of Funding for FY89



Industry: Union Carbide $10,000,000

Services Provided

Major Areas of Expertise

- Pioneers in development and application of toxicological test methods
- Animal toxicology, teratology, pathology, analytical clinical chemistry and genetic toxicology
- Toxicokinetics
- Material balance studies

Current Activity Mix

- Basic Research 5%
- Applied Research 95%
- Unique Specialties: Inhalation facility; neurotoxicology facilities

Major Projects in FY89

1. Acute Animal Studies
2. Short-Term Animal Studies
3. Subchronic and Chronic Studies
4. Cytotoxicity Screening
5. Genotoxicity Screening

Technology Transfer Mechanisms/ Outreach Programs

Annual Report: December

Networking Activities

Current Affiliations

- Under primary control of Union Carbide Corporation
- New York Society of Toxicology

History

Date Founded: 1936
Founders: Mellon Institute; Union Carbide
Reasons for Founding: In response to public attitudes concerning the effects of toxic chemicals on the environment.

Carnegie Mellon University

Carnegie Mellon Research Institute
4400 Fifth Avenue
Pittsburgh, PA 15213 2683

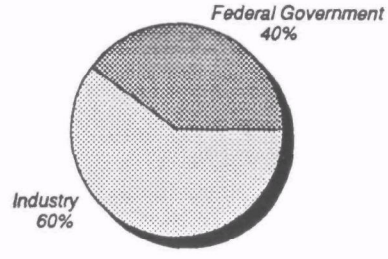
Carnegie Mellon Research Institute seeks to promote the successful transfer of technology from the laboratory to commercial application, and to assist sponsors in the assessment, evaluation, and management of improved techniques and technologies. The institute's biotechnology center has ongoing activities in the development of biological methods for the treatment of toxic wastes.

Director: William M. Kaufman
Phone: (412)268-3440

Size and Scope

Number of Personnel: 130 FTEs: 130
Technical: 95 Administrative: 35

Sources of Funding for FY89



Federal Government: DOE; NSF; DOT . . $3,200,000
Industry $4,800,000

Services Provided

Major Areas of Expertise

- Solid state sensors and materials
- Computer control systems
- Biotechnology
- Ozone research
- Modernizing transportation systems

Current Activity Mix

- Basic Research 10%
- Applied Research 90%
- Products or Processes Commercialized: Sensor and instrumentation for detection of hazardous gases (American Intell-Sensors Corporation)

Major Projects in FY89

1. Bio-Remediation of Soils Contaminated with Wood-Treating Chemicals
2. Modeling of Atmosphere Dynamics and Global Air Pollution
3. Impact of Environmental Regulation on Coal-Based Utilities
4. Development of Advances Sensors for the Detection of Noxious Gases

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	1
Annual Report:	January
Courses Offered in 1989:	1
Patents Issued in the Last 3 Years:	5

History

Date Founded: 1913
Founders: Carnegie Mellon University
Reasons for Founding: To generate and diffuse knowledge that may be useful in industrial applications

Case Western Reserve University

Case Center for Complex Flow Measurements
Department of Mechanical and Aerospace Engineering
Cleveland, OH 44106

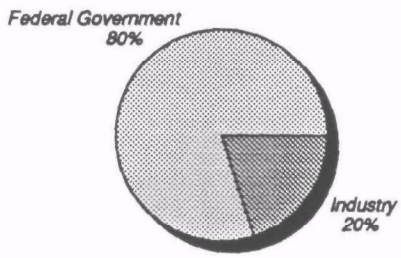
Case Western Reserve University's Case Center for Complex Flow Measurements is known for its research on air pollution and heat transfer as well as its complex flow measurements. Current projects at the center focus on atmospheric concentration, wind turbulence and pollutant dissemination.

Director: Alexander Dybbs, Co-Director
Phone: (216)368-6448

Size and Scope

Number of Personnel:	19	FTEs:	19
Technical:	15	Administrative:	4
Background: PhDs:	9	MSs:	10

Sources of Funding for FY89



Federal Government: NSF; DOD; DOE; NASA $800,000
Industry: B.F. Goodrich $200,000

Services Provided

Major Areas of Expertise
- Complex flow measurements
- Air pollution
- Heat transfer

Current Activity Mix
- Basic Research 40%
- Applied Research 60%
  Prototype Development
- Products or Processes Commercialized: Unique ejectors; blowoff nozzles

Major Projects in FY89

1. Atmosphere Concentration Research
2. Wind Turbulance Study
3. Pollutant Dissemination Research

Technology Transfer Mechanisms/ Outreach Programs

Annual Report: January

History

Date Founded: 1983
Founders: Dr. Alexander Dybbs
Reasons for Founding: To give engineering students more hands-on research in air pollution and related studies.

Cincinnati, University of

Center Hill Solid and Hazardous Waste Research Laboratory
5995 Center Hill Road
Cincinnati, OH 45224

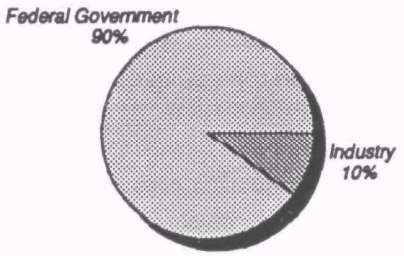
University of Cincinnati's Center Hill Solid and Hazardous Waste Research Laboratory provides geotechnical, geochemical and geoscientific technical support services to EPA for various Superfund and RCRA (Resource Conservation and Recovery Act) projects. The laboratory supports research on soil, chemical and hydrological interactions, focusing on chemical stabilization of contaminated soils and contaminant control systems in groundwater.

Director: Gerald Roberto, Project Manager
Phone: (513)569-7885

Size and Scope

Number of Personnel:	35	FTEs:	20
Technical:	31	Administrative:	4
Background: PhDs:	8	MSs:	15
BSs:	12		

Sources of Funding for FY89



Federal Government: EPA $1,800,000
Industry $200,000

Services Provided

Major Areas of Expertise

- Environmental and civil engineering
- Ground water hydrology
- Geochemical technology

Current Activity Mix

- Basic Research 20%
- Applied Research 80%

Major Projects in FY89

1. Detection of Leaks in Cut-Off Walls
2. Chemical Stabilization and Solidification of Hazardous Wastes
3. Innovative Technology of Hazardous Waste for Remediation
4. Computer-Aided Site Characterization
5. Permeability Tests

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1

Networking Activities

Current Affiliations

- Technology assistance program to all EPA regions

History

Date Founded: 1983
Founders: University of Cincinnati
Reasons for Founding: To conduct hazardous waste research

Colorado State University

Cooperative Institute for Research in the Atmosphere (CIRA)
Foothills Campus
Fort Collins, CO 80523

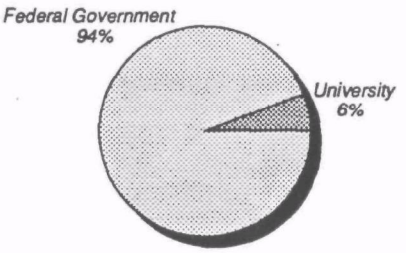
Colorado State University's Cooperative Institute for Research in the Atmosphere was formed to increase the effectiveness of atmospheric research which is of mutual interest to the university, the state and NOAA. The institute concentrates its research on air quality, cloud physics, satellite applications, climate studies, agricultural meteorology, model evaluation, and mesoscale studies and forecasting.

Director: Thomas H. Vonder Haar
Phone: (303)491-8448

Size and Scope

Number of Personnel:	50	FTEs:	41
Technical:	35	Administrative:	6
Background: PhDs:	16	MSs:	11

Sources of Funding for FY89



University: Colorado State University . . $205,000
Federal Government: NOAA; NSF; ONR; U.S. Army Research Center $3,317,232

Services Provided

Major Areas of Expertise

- Atmospheric research
- Air quality
- Cloud physics
- Mesoscale studies and forecasting
- Satellite applications
- Climate studies

Current Activity Mix

- Basic Research 50%
- Applied Research 50%

Major Projects in FY89

1. Software Technology Transfer "Project Share", Support Services to the World Meteorological Organization
2. Statistical Technique for Identifying the Origin of Air Masses
3. Assessment of Observer Sensitivity for Regional Haze and Refinement of Layered Haze Indicators
4. Investigation of the Application of Monte Carlo Methods to Problems of Visibility
5. Mesoscale Analysis and Forecast Product Development for Severe Storm Nowcasting

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Annual Report:	August
Courses Offered in 1989:	13

Networking Activities

Current Affiliations

- McGill University
- Illinois State Water Survey
- Monash University
- World Meterological Organization

International Affiliations

- Institute for Atmospheric Physics, IFS-CNR, Rome, Italy
- Center for Scientific Investigation and Higher Education, Ensenada, Mexico

History

Date Founded: 1980

Founders: Colorado State University; NOAA

Reasons for Founding: Increase effectiveness of atmospheric research

Colorado State University

Fluid Dynamics and Diffusion Laboratory
College of Engineering
Foothills Campus
Fort Collins, CO 80523

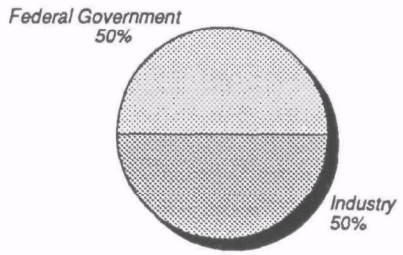
Colorado State University's Fluid Dynamics and Diffusion Laboratory has special boundary layer wind tunnels for simulation of atmospheric motions, providing a capability for unique research on wind engineering and environmental problems of state, national and international concern. The laboratory studies the motion of gases and liquids to support and stimulate many applications in engineering, architecture, agriculture, meteorology, oceanography and biology.

Director: R.N. Meroney, Prof-in-charge
Phone: (303)491-8574

Size and Scope

Number of Personnel:	13	FTEs:	10
Technical:	11	Administrative:	1
Background: PhDs:	10		

Sources of Funding for FY89



Federal Government: DOD; EPA; DOE; DOT; NSF $500,000

Industry: Gas Research Institute; Exxon Oil; Bechtel; Mobil; New York Park Authority $500,000

Services Provided

Major Areas of Expertise

- Wind engineering
- Fluid mechanics
- Air pollution
- Hazardous spill research

Current Activity Mix

- Basic Research 50%
- Applied Research 50%
- Unique Specialties: Extensive wind tunnel facilities

Major Projects in FY89

1. City of Boston Central Arteries Project (Ventilation for Underground Highways)
2. Wind Engineering Joint Project with NSF and Texas Tech University
3. Natural Gas Spill Research with Gas Research Institute

Networking Activities

Current Affiliations

- Gas Research Institute
- Solar Energy Research Institute
- National Center for Atmospheric Research

History

Date Founded: 1950
Founders: State of Colorado
Reasons for Founding: To study wind tunnel simulation and wind engineering research

Colorado, University of (Boulder)

Cooperative Institute for Research in Environmental Sciences
Campus Box 449
Boulder, CO 80309

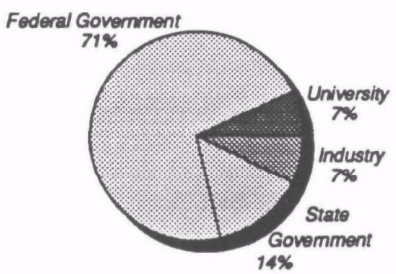
University of Colorado, Boulder's Cooperative Institute for Research in Environmental Sciences is jointly sponsored by the National Oceanic and Atmospheric Administration and the university. The institute 's research aims at understanding the physics and chemistry of the solid earth and its atmosphere, cryosphere and oceans through field studies, laboratory experimental programs and theoretical investigations. Several specialized research centers exist under the Institute's imprimatur.

Director: Robert Sievers
Phone: (303)492-1143

Size and Scope

Number of Personnel:	400	FTEs:	400
Technical:	350	Administrative:	50

Sources of Funding for FY89



University: University of Colorado, Boulder $1,000,000
Federal Government: NIH; DOD; NSF; NOAA; NASA; DOE; EPA; U.S. Geological Survey . $10,000,000
State Government $2,000,000
Industry $1,000,000

Services Provided

Major Areas of Expertise

- Atmospheric chemistry
- Global change
- Measurement instrumentation for environmental systems
- Superconductivity
- Atmospheric climate dynamics
- Solid earth science
- Earthquake prediction
- Air and water pollution
- Hazardous waste treatment and management
- Geodesy (movement in earths crust)

Current Activity Mix

- Basic Research 90%
- Applied Research 10%
  - Prototype Development
  - Market Assessment

Major Projects in FY89

1. Studies of Global Change
2. Atmospheric Quality and Chemistry Studies
3. Earthquake Prediction
4. Chemical Vapor Deposition of Superconducting Thin Films
5. Studies of Earth from Space

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	51
Annual Report:	Spring
Patents Issued in the Last 3 Years:	20

Other: University of Colorado Foundation; formation of new companies; transfer of trained personnel

Networking Activities

Current Affiliations

- National Center for Atmospheric Research
- National Academy of Science's National Research Council

History

Date Founded: 1967
Founders: University of Colorado; NOAA
Reasons for Founding: Research and teaching in wide-ranging disciplines of the environmental sciences

Connecticut, University of

Marine Sciences Institute
Avery Point
Groton, CT 06340

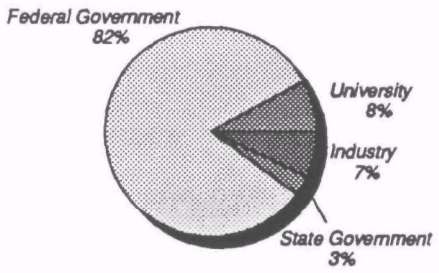
The Marine Sciences Institute at the University of Connecticut conducts research on coastal environments, sea surface phenomenon, acoustic research and manned and unmanned submersibles.

Director: Donald F. Squires
Phone: (203)445-3438

Size and Scope

Number of Personnel:	68	FTEs:	68
Technical:	56	Administrative:	12
Background: PhDs:	11	MSs:	11
BSs:	30		

Sources of Funding for FY89



University: University of Connecticut	$420,000
Federal Government: NSF; EPA; NOAA; ONR; U.S. Navy	$4,305,000
State Government	$157,500
Industry	$367,500

Services Provided

Major Areas of Expertise

- Coastal environmental research
- Sea surface phenomenon
- Acoustic research
- Manned and unmanned submersibles
- National undersea research

Major Projects in FY89

1. National Undersea Research Center Activities in the Great Lakes, Gulf of Maine, Long Island Sound, Africa and Israel
2. Connecticut Sea Grant College Program Research, Education and Public Service
3. Physics and Chemistry of the Subsurface
4. Long Island Sound Environmental Study
5. Beuthic Biological Studies

Networking Activities

Current Affiliations

- U.S. Sea Grant College

International Affiliations

- Ireland University College, Galway, Ireland

History

Date Founded: 1967
Founders: Peter Dehlinger
Reasons for Founding: Oceanographic interest in above and below surface phenomena

Cornell University

Ecosystems Research Center
311 Corson Hall
Ithaca, NY 14853 2701

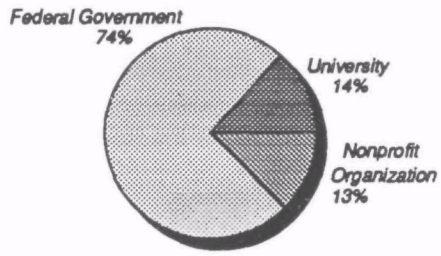
The Ecosystems Research Center (ERC) at Cornell University was established to study how environmental stresses affect whole biological communities and ecosystems. ERC specializes in risk assessment, waste management, remote sensing, and in research pertaining to global environmental change.

Director: Leonard Weinstein
Phone: (607)255-4747

Size and Scope

Number of Personnel:	17	FTEs:	7
Technical:	14	Administrative:	3
Background: PhDs:	10		

Sources of Funding for FY89



University: Cornell University $95,000
Federal Government: EPA Technology Transfer Mechanisms/ Outreach Programs . . . $520,000
Nonprofit Organization: Electric Power Research Institute, 3412 Hillview Avenue, Palo Alto, California $88,000

Services Provided

Major Areas of Expertise

- Ecosystem science
- Waste management
- Remote sensing
- Water quality

Current Activity Mix

- Basic Research 100%

Major Projects in FY89

1. The Functional Role of Coastal Marine Benthos
2. Development and Testing of a Model of Plant Response to Air Pollution from Municipal Incinerators
3. Methane and Nitrous Oxide Emissions from Natural Systems
4. Seagrasses as Chemical and Biological Indicators for Coastal Ecosystems
5. The Effects of Climate Change on Ecosystem Boundaries

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 3
Annual Report: December

Networking Activities

Current Affiliations

- Oakridge National Laboratories
- Electric Power Research Institute
- Boyce Thompson Institute for Plant Research
- Institute for Ecosystems Research

History

Date Founded: 1980
Founders: EPA
Reasons for Founding: To analyze and evaluate whole biological communities and ecosystems

Delaware, University of

Center for Remote Sensing
College of Marine Studies
Newark, DE 19716

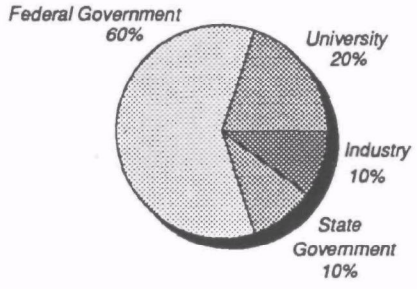
The University of Delaware's Center for Remote Sensing serves as a focal point for research on remote sensing of the physical, geological and biochemical properties of the oceans and the coastal zone. The center is an integral part of the College of Marine Studies and specializes in interdisciplinary research and training with emphasis on the coastal environment and marine resources.

Director: Vic Klemas
Phone: (302)451-2336

Size and Scope

Number of Personnel:	16	FTEs:	16
Technical:	15	Administrative:	1
Background: PhDs:	7	MSs:	4

Sources of Funding for FY89



University: University of Delaware . . . $300,000
Federal Government: NASA; NOAA; EPA; Army Corps of Engineers; NSF $900,000
State Government $150,000
Industry $150,000

Services Provided

Major Areas of Expertise

- Remote sensing
- Environmental monitoring of coast processes
- Wetlands studies
- Coastal and water productivity
- Resource management

Current Activity Mix

- Basic Research 40%
- Applied Research 60%
  Prototype Development

Major Projects in FY89

1. Drift and Dispersion of Ocean-dumped Wastes along U.S. East Coast
2. Modeling and Observing Oil Slick Drift and Capture along Coastal Fronts
3. Wetland Biomass Production and Related Gas Emission
4. Development of Advanced Aircraft/Satellite Sensing Techniques
5. Mangrove Losses in Ecuador, Costa Rica and Venezuela.

Technology Transfer Mechanisms/ Outreach Programs

Other: Staff work as consultants to: UNDP; UNESCO; NSF; NASA; NOAA; EPA; DOE; Army Corps of Engineers

Networking Activities

International Affiliations

- Tinker Foundation, 55 East 59th Street, New York, NY 10022
- Argentine Council on Scientific Research; University of Ankara, Turkey

History

Date Founded: 1976
Founders: University of Delaware
Reasons for Founding: To study marine environment

Duke University

Research Triangle Institute
P.O. Box 12194
Research Triangle Park, NC 27709

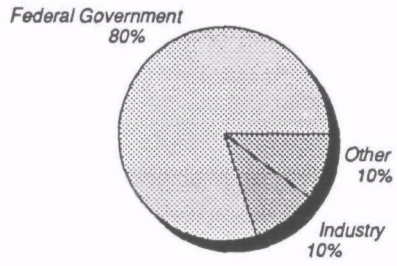
Duke University's Research Triangle Institute is cosponsored by North Carolina State University and the University of North Carolina at Chapel Hill. The institute responds to complex, interdisciplinary research opportunities in chemical, life, engineering, social and statistical sciences, emphasizing improved measurements of toxic substances in the human body and effective means to minimize and manage the risks inherent in hazardous exposures.

Director: George R. Herbert, President
Phone: (919)541-6000

Size and Scope

Number of Personnel:	1450	FTEs:	1450
Technical:	1130	Administrative:	320
Background: PhDs:	254	MSs:	260
BSs:	326		

Sources of Funding for FY89



Federal Government: DOD; EPA; NASA; HHS; USAID $70,640,000
Industry $8,830,000
Other: State Government; Local Government; Nonprofit Organizations $8,830,000

Services Provided

Major Areas of Expertise

- Life sciences
- Energy
- Engineering
- Environmental research
- Toxicology

Current Activity Mix

- Basic Research 20%
- Applied Research 80%
  Prototype Development
  Market Assessment
- Products or Processes Commercialized: Architectural design and assessment system software package

Major Projects in FY89

1. National Household Survey on Drug Abuse
2. Longitudinal Study on Drug Abuse Treatment
3. Parallel Processor for Atmospheric Modeling
4. New Pharmaceutical Compounds

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Annual Report:	January
Patents Issued in the Last 3 Years:	12

History

Date Founded: 1958
Founders: Duke University; University of North Carolina; North Carolina State University
Reasons for Founding: To provide an environmental research base for three universities

Florida Institute of Oceanography

830 First Street South
St. Petersburg, FL 33701

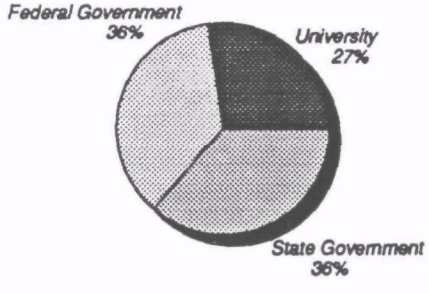
Florida Institute of Oceanography is a state consortium of the state university system, private universities and state agencies. The institute offers all the advantages of an interinstitutional oceanographic association with the capacity of drawing on many highly qualified member scientists. The institute provides, operates and maintains ship and shore support equipment and facilities.

Director: John C. Ogden
Phone: (813)893-9100

Size and Scope

Number of Personnel:	21	FTEs:	20
Technical:	7	Administrative:	14
Background: PhDs:	3	MSs:	4

Sources of Funding for FY89



University: Florida Institute of Oceanography	$750,000
Federal Government: NOAA	$1,000,000
State Government	$1,000,000

Services Provided

Major Areas of Expertise

- Coordinates oceanographic training and research of member universities (9 public universities of the state university system in Florida, and University of Miami)
- Florida Department of Natural Resources
- The Florida Sea Grant College

Current Activity Mix

- Basic Research 50%
- Applied Research 50%
- Unique Specialties: Environmental monitoring in South Florida

Major Projects in FY89

1. Long-Term Environmental Monitoring of Florida Keys
2. Minerals Management (Florida Atlantic Coast)
3. Affects of Hydrocarbons on Turtles
4. Staffing, Maintaining, Operating 2 Oceanographic Research Vessels, Shore and Laboratory Facilities and Equipment

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	1
Annual Report:	September

Networking Activities

Current Affiliations

- Southern Association of Marine Laboratories
- Sea Grant Colleges
- 9 Florida State Universities and University of Miami
- Florida Department of Natural Resources

History

Date Founded: 1978
Founders: Florida Institute of Technology Board of Regents
Reasons for Founding: To coordinate and consolidate resources, facilities and services in Florida

Florida International University

Drinking Water Research Center
College of Engineering and Applied Sciences
University Park Campus
Miami, FL 33199

Florida International University's Drinking Water Research Center conducts research in the area of water, wastewater and hazardous waste, at five associated laboratories. The center serves as the major instrumenta-

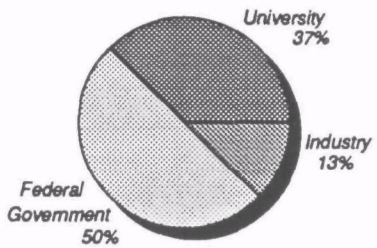
tion center on campus for performing trace analysis of organic and inorganic compounds in water. The center is a State of Florida certified laboratory for drinking water.

Director: William J. Cooper
Phone: (305)348-2826

Size and Scope

Number of Personnel:	11	FTEs:	10
Technical:	8	Administrative:	3
Background: PhDs:	6	MSs:	1
BSs:	1		

Sources of Funding for FY89



University: Florida International University	$450,000
Federal Government: EPA; NSF; U.S. Geological Survey	$600,000
Industry	$150,000

Services Provided

Major Areas of Expertise

- Wetlands ecology

Current Activity Mix

- Basic Research 90%
- Applied Research 10%
- Unique Specialties: Pilot facility for high-voltage treatment of hazardous waste

Major Projects in FY89

1. Trace Analysis Center for Drinking Water
2. Waste Water and Hazardous Waste Treatment
3. Photochemistry Study of Sun and Surface Water
4. Study of Everglades Wetlands (Bacteria and Water Quality)
5. Remote Sensing of Algae in Water

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	3
Annual Report:	May

Networking Activities

International Affiliations

- Environment Canada
- Japanese Atomic Energy Research Institute (Takasaki)
- International Atomic Energy Group, Austria

History

Date Founded: 1977
Founders: Florida State Legislature
Reasons for Founding: Florida House Bill 555

Florida State University

Center for Biomedical and Toxicological Research
Bellamy Building
Tallahassee, FL 32306

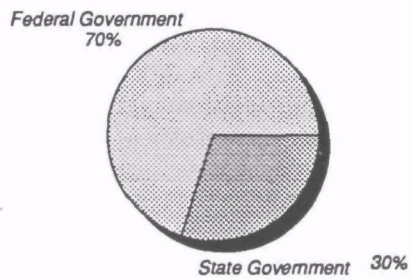
Florida State University's Center for Biomedical and Toxicological Research and Hazardous Waste Management assists local, state and Federal agencies, and private industry in identifying, defining and assessing environmental trends in hazardous waste management. The center develops technologies, methodologies, data bases and training programs to promote cost-effective and environmentally sound prevention, spill response and contigency planning.

Director: Roy C. Herndon
Phone: (904)644-5524

Size and Scope

Number of Personnel:	30	FTEs:	30
Technical:	25	Administrative:	5
Background: PhDs:	10	MSs:	15
BSs:	5		

Sources of Funding for FY89



Federal Government: EPA	$560,000
State Government	$240,000

Services Provided

Major Areas of Expertise

- Toxicology program
- Waste management and environmental studies
- Industrial waste exchange program with industry

Current Activity Mix

- Basic Research 5%
- Applied Research 95%

Major Projects in FY89

1. Development of Toxicant Profiles
2. Development of Special Environmental Monitoring Systems
3. Training on Toxicology Risk Assessment

Technology Transfer Mechanisms/ Outreach Programs

Courses Offered in 1989: 10

Other: Industrial waste exchange program sponsored through the State of Florida

Networking Activities

International Affiliations

- University of Lausanne, Switzerland

History

Date Founded: 1980

Founders: State of Florida

Reasons for Founding: To provide technical assistance to state health and environmental agencies; to conduct basic toxicology research

Florida State University

Supercomputer Computations Research Institute
400 Science Center Library
Tallahassee, FL 32306 4052

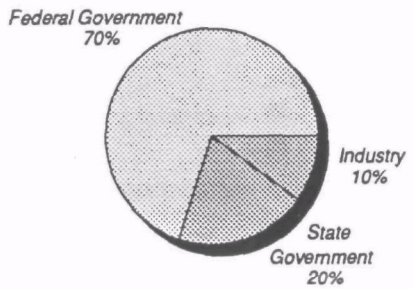
Florida State University's Supercomputer Computations Research Institute was created to expand the base of research and development in computational science and technology. The institute encourages joint government, industry and university participation in improving basic tools, languages and associated theory. Environmental applications include modeling of thunderstorms and acid rain, tracking potential oil spills and predicting changes in the Earth's climate.

Director: Joseph Lannuttti
Phone: (904)644-1010

Size and Scope

Number of Personnel:	55	FTEs:	50
Technical:	35	Administrative:	15
Background: PhDs:	40	MSs:	15

Sources of Funding for FY89



Federal Government: DOE; U.S. Navy . $10,500,000
State Government: Florida Water Districts . $3,000,000
Industry: Control Data; Reynolds Metals . $1,500,000

Services Provided

Major Areas of Expertise

- Computational science
- Supercomputing with ETA10 supercomputer

Current Activity Mix

- Basic Research 97%
- Applied Research 3%
  Prototype Development
- Unique Specialties: ETA10 supercomputer

Major Projects in FY89

1. Tracking Potential Oil Spills on Florida's Coastline
2. Using Supercomputer Model to Investigate Thunderstorms and Acid Rain Transporters of Pollution
3. Florida Aquifer Research Modeling
4. Designing High Energy Particle Physics Experiments for the Superconducting Super Collider
5. Modeling the Human Genome Using Gel Electrophoresis

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 52
Annual Report: January
Courses Offered in 1989: 6

Networking Activities

Current Affiliations

- Southwestern University Network
- Energy Science Network
- Energy Service Network Subscriber

International Affiliations

- Center for European Nuclear Research, Geneva, Switzerland

History

Date Founded: 1984
Founders: Florida State Universtiy, Control Data
Reasons for Founding: To address computational needs of DOE

Florida, University of

Center for Aquatic Plants
7922 N.W. 71st Street
Gainesville, FL 32646

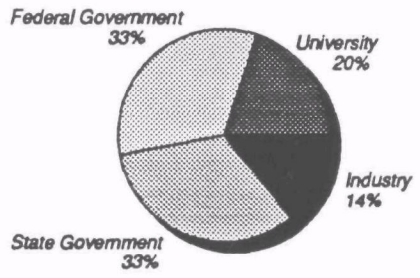
University of Florida's Center for Aquatic Plants was directed to develop environmentally sound techniques for the management of aquatic weed species and to coordinate aquatic plant research activities within the State of Florida. The center has developed multidisciplinary research, teaching and extension programs by drawing on many departments within the university and its agricultural research and education centers throughout Florida.

Director: Joseph C. Joyce
Phone: (904)392-9613

Size and Scope

Number of Personnel:	8	FTEs:	8
Technical:	5	Administrative:	3
Background: PhDs:	1	MSs:	2

Sources of Funding for FY89



University: University of Florida $200,000
Federal Government: USDA; DOI; Army Corps of Engineers $330,000
State Government: Florida Department of Fish and Game; Florida Department of Natural Resources; Florida Water Districts $330,000
Industry $140,000

Services Provided

Major Areas of Expertise

- Aquatic plant ecology
- Fisheries management
- Limnology
- Water quality

Current Activity Mix

• Basic Research	25%
• Applied Research	75%

Major Projects in FY89

1. Development of Economic Uses of Aquatic Plants
2. Development of Herbicide Application Techniques
3. Defining the Economic Impact of Aquatic Plants and Plant Management
4. Evaluation of Aquatic Herbicide Efficiency

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	1
Patents Issued in the Last 3 Years:	1

Other: Aquatic plant database for Public Use

History

Date Founded: 1978
Founders: State Legislature
Reasons for Founding: To conduct research on aquatic plants that are vital to Florida's environment.

Florida, University of

Central Florida Research and Education Center, Apoka
Institute of Food and Agricultural Sciences
2700 East Celery Avenue
Sanford, FL 32771

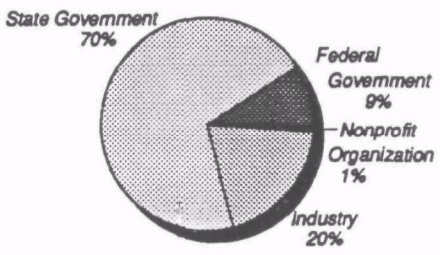
University of Florida's Central Florida Research and Education Center, Apopka, was established to provide research on commerical foliage plant production, including rates and blends of fertilizer application and disease and insect control. Major research emphasis is placed on the effects of biological and physical stress on plant growth, with programs in plant physiology, plant pathology, genetics, entomology, nematology and horticulture.

Director: Charles A. Conover
Phone: (407)889-4161

Size and Scope

Number of Personnel:	80	FTEs:	80
Technical:	79	Administrative:	1
Background: PhDs:	19	MSs:	5

Sources of Funding for FY89



Federal Government: USDA; EPA . . . $270,000
State Government: Florida Water Districts; Florida Department of Environmental Regulation . $2,100,000
Industry: Grace Chemical $600,000
Nonprofit Organization: American Assn of Nurserymen; Florida Growers and Nurserymen Assn; Florida Foliage Assn $30,000

Services Provided

Major Areas of Expertise

- Agricultural research
- Pest control
- Water quality
- Insects affecting man
- Plant nutrition
- Development of new varieties of plants

Current Activity Mix

- Basic Research 30%
- Applied Research 70%
- Products or Processes Commercialized: A biocontrol organism
- Unique Specialties: A major US center for foliage and interior plants; developed the only grape that can survive the Florida climate

Major Projects in FY89

1. Nitrate Influences on Surfacial Aquifer from Fertilization
2. Development of seedles watermelons
3. Creation of cultivars for Florida grape industry
4. Integrated Pest Management Programs for Ornamentals

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1
Other: Articles in referenced publications

Networking Activities

Current Affiliations

- USDA Experimental Station, Orlando, Florida
- Fort Lauderdale Research and Education Center
- Gulf Coast Research and Education Center
- Department of Ornamental Horticulture, University of Florida

History

Date Founded: 1969
Founders: Florida State Legislature
Reasons for Founding: To serve the ornamental plant industry

Florida, University of

Engineering and Industrial Experiment Station
300 Weil Hall
Gainesville, FL 32611

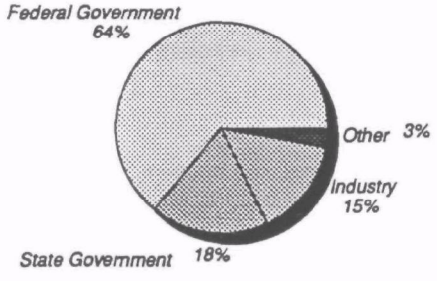
University of Florida's Engineering and Industrial Experiment Station has a broad spectrum of research: automation technologies and manufacturing sciences, biotechnology, communication technology, biomedical engineering, microelectronics, conventional and alternative energy technologies. Many of the station's programs seek to improve industrial or agricultural productivity through the development of new materials, devices or processes.

Director: M.J. Ohanian
Phone: (904)392-0946

Size and Scope

Number of Personnel:	250	FTEs:	100
Technical:	85	Administrative:	15
TBackground: PhD 90	MSs:	10	

Sources of Funding for FY89



Federal Government $23,680,000
State Government $6,660,000
Industry: IBM; General Electric; Harris . . $5,550,000
Other $1,110,000

Services Provided

Major Areas of Expertise

- Civil, chemical and environmental engineering research
- Waste management
- Energy conservation

Current Activity Mix

- Basic Research 50%
- Applied Research 50%
- Products or Processes Commercialized: Bioglass; Gelsil

Major Projects in FY89

1. Microelectronics and Materials: Joint project with Defense Advanced Research Projects (DARPA)
2. Optoelectronics, Advanced Composites, and Superconductors
3. Software Industry Study
4. Design of a Biofilter System for Odor Control

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Patents Issued in the Last 3 Years:	60
Patent Licenses Issued in the Last 3 Years:	10

Networking Activities

Current Affiliations

- NASA - Southern Technology Applications Center
- Innovative Nuclear Space Policy Institute
- DARPA

History

Date Founded: 1941
Founders: State of Florida
Reasons for Founding: To enhance industrial development

Georgia Institute of Technology

Environmental Science and Technology Division,
Economic Development Laboratory
Georgia Tech Research Institute
Atlanta, GA 30332

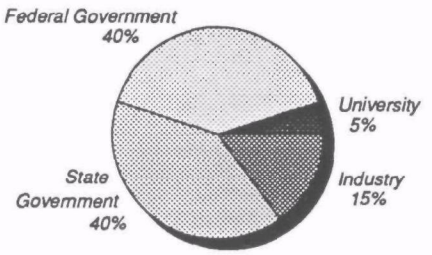
Georgia Institute of Technology's Economic Development Laboratory focuses its research on environmental science, occupational health and safety, environmental engineering and hazardous materials management. The laboratory supports both the government and local industry, through its operation of twelve regional offices throughout the State of Georgia.

Director: John Nemeth
Phone: (404)894-8076

Size and Scope

Number of Personnel:	100	FTEs:	80
Technical:	60	Administrative:	20
Background: PhDs:	7	MSs:	22
BSs:	31		

Sources of Funding for FY90



University: Georgia Institute of Technology	$250,000
Federal Government: EPA; DOE; U.S. Army; OSHA	$2,000,000
State Government	$2,000,000
Industry: Coca Cola; Johnson & Johnson	$750,000

Services Provided

Major Areas of Expertise

- Hazardous waste
- Hazardous materials management
- Occupational health and safety environmental engineering
- Environmental science (from ecology to indoor air quality)

Current Activity Mix

- Applied Research 100%
  Prototype Development
  Market Assessment
- Products or Processes Commercialized: Thermal dewatering of poultry process waste sludges; computerized environmental management systems
- Unique Specialties: Largest continuing education program in hazardous waste and related sciences; special asbestos abatement training

Major Projects in FY89

1. Osha On-Site Consultation Program (for Small and Medium Sized Private Businesses)
2. Hazardous Material Technical Assistance Program (State Funded)
3. Hazardous Chemicals Handling: Training in Technical Assistance for Public Employees
4. Southeast Asbestos Information Center for U.S. EPA
5. Agricultural Research Program

Technology Transfer Mechanisms/ Outreach Programs

Courses Offered in 1989: 100
Other: Technical information sheets on safety and hazardous waste

Networking Activities

Current Affiliations

- Oak Ridge Associated Universities
- Rice University
- Wayne State University
- Johns Hopkins University
- Massachusetts Institute of Technology

History

Date Founded: 1978
Founders: Bill Howard
Reasons for Founding: Received OSHA on-site consultation program

Harvard University

Kresge Center for Environmental Health
665 Huntington Avenue
Boston, MA 02115

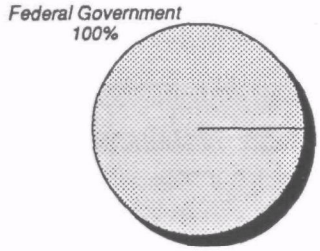
Harvard University's Kresge Center for Environmental Health conducts environmental health-related research and training activities. The center draws on resources from the departments of biostatistics, cancer biology, epidemiology and environmental science and physiology, plus the laboratory of toxicology. The center is designed to foster formal and informal cross-department collaborative arrangements that enhance academic programs and multidisciplinary research projects.

Director: John B. Little
Phone: (617)432-1184

Size and Scope

Number of Personnel:	50	FTEs:	37
Technical:	45	Administrative:	5
Background: PhDs:	17	MSs:	1

Sources of Funding for FY89



Federal Government: NIH; National Institutes of Environmental Health Sciences $1,250,000

Services Provided

Major Areas of Expertise

- Research and training in the fields of epidemiology and occupational health

Current Activity Mix

• Basic Research	67%
• Applied Research	33%

Major Projects in FY89

1. Biochemical Toxicology: Site Specific Mutagenesis
2. Radiation Biology and Experimental Carcinogenesis: Mutations and Malignant Transformations
3. Respiratory Biology and Inhalation Studies: Animal Bioassays for Inhaled Gases and Particles
4. Environmental Epidemiology: Health Factors in Respiratory and Cardiovascular Disease
5. Occupational Health: Studying Employment Associated Hazards and Ways to Reduce or Eliminate Them

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Annual Report:	January
Courses Offered in 1989:	19

Networking Activities

Current Affiliations

- National Institutes of Health Centers of Excellence

History

Date Founded: 1962
Founders: Harvard University
Reasons for Founding: To coordinate Harvard's environmental health programs

Hawaii, University of

Hawaii Undersea Research Laboratory (HURL)
Marine Sciences Building
1000 Pope Road
Honolulu, HI 96822

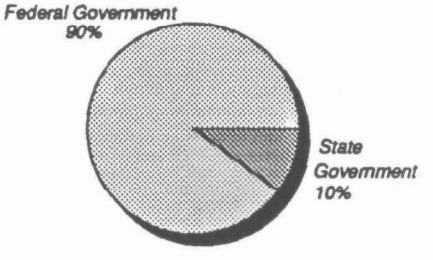
The Hawaii Undersea Research Laboratory (HURL) was established by a cooperative agreement between NOAA and the University of Hawaii. The HURL program concentrates its research efforts on fisheries, pollution, sea floor properties and processes and ocean technology and services.

Director: Alexander Malahoff
Phone: (808)948-6335

Size and Scope

Number of Personnel:	22	FTEs:	15
Technical:	18	Administrative:	4
Background: PhDs:	7	MSs:	2
BSs:	13		

Sources of Funding for FY89



Federal Government: NOAA $2,700,000
State Government $300,000

Services Provided

Major Areas of Expertise
- Fisheries
- Pollution
- Sea floor properties and processes
- Ocean technology

Current Activity Mix
- Basic Research 90%
- Applied Research 10%
  Prototype Development
- Unique Specialties: Operates three submarines for research

Major Projects in FY89

1. Enewetak Atoll Study
2. Johnson Atoll Study
3. Effects of Dredge Spoil on the Deep Benthos
4. Benthic Metabolism around Deep Sewer Outfalls
5. Mapping the Puna Submarine Canyon and Kealakua Bay

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 2
Annual Report: January

History

Date Founded: 1980
Founders: University of Hawaii
Reasons for Founding: Started as part of NOAA's Undersea Research Program

Illinois Institute of Technology and Illinois Institute of Technology Research Institute

The Center for Hazardous Waste Management
10 West 35th Street
Chicago, IL 60616

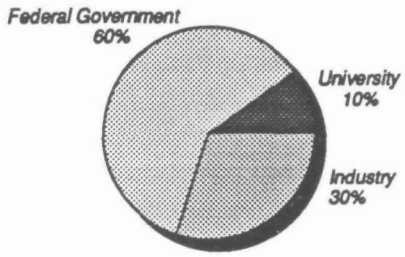
The Center for Hazardous Waste Management is jointly sponsored by the Illinois Institute of Technology and its sister organization, the Illinois Institute of Technology Research Institute. The center concentrates its efforts in the areas of new waste treatment methods, as well as assisting industry and government in dealing with all aspects of hazardous wastes.

Director: Glenn Paulson
Phone: (312)567-4250

Size and Scope

Number of Personnel:	37	FTEs:	15
Technical:	35	Administrative:	2
Background: PhDs:	12	MSs:	18
BSs:	5		

Sources of Funding for FY89



University: Illinois Institute of Technology; Illinois Institute of Technology Research Institute . $200,000
Federal Government: DOD: EPA $1,200,000
Industry: Coalition on Superfund $600,000

Services Provided

Major Areas of Expertise

- Hazardous waste treatment and management
- Toxicology
- Groundwater
- Air quality

Current Activity Mix

- Basic Research 25%
- Applied Research 75%
  - Prototype Development
  - Market Assessment
- Unique Specialties: Center has a comprehensive Resources Conservation and Recovery Act (RCRA) Permit to study large amounts of hazardous waste at its facilities

Major Projects in FY89

1. Metal Speciation and Control Methods
2. Hydrazine and Nitrous Oxide Scrubbers for U.S. Space Shuttle
3. Control of Toxic Air Pollutants
4. Field Evaluation of Odors
5. Modeling and Monitoring of Contaminant Migration

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	12
Courses Offered in 1989:	6
Patent Licenses Issued in the Last 3 Years:	1

Networking Activities

Current Affiliations

- Illinois Institute of Technology
- Illinois Institute of Technology, Research Institute
- Industrial Waste Elimination Research Center

History

Date Founded: 1987
Founders: Illinois Institute of Technology; Illinois Institute of Technology Research Institute
Reasons for Founding: To better utilize the resources of the two parent organizations

Illinois Institute of Technology

Industrial Waste Elimination Research Center
3201 South State Street
Chicago, IL 60616

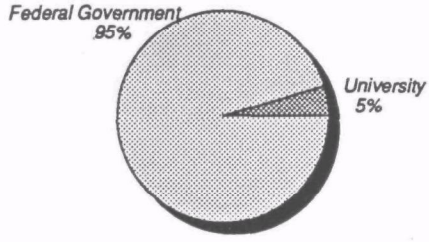
The Industrial Waste Elimination Research Center at the Illinois Institute of Technology was founded to spearhead collaboration between government agencies, private industry, and university scientists to tackle waste elimination problems. The center's research is directed toward refining technologies to reduce or eliminate the generation of industrial pollutants.

Director: Kenneth Noll
Phone: (312)567-3533

Size and Scope

Number of Personnel:	12	FTEs:	12
Technical:	10	Administrative:	2
Background: PhDs:	9	MSs:	3

Sources of Funding for FY89



University: Illinois Institute of Technology . . $26,000
Federal Government: EPA $540,000

Services Provided

Major Areas of Expertise

- Industrial waste recycling
- Recovery and reuse
- Waste minimization of air and water resources

Current Activity Mix

- Basic Research 33%
- Applied Research 67%
  - Prototype Development
  - Market Assessment
- Prototype Development
- Market Assessment
- Products or Processes Commercialized: Chemical feed stock products
- Unique Specialties: Heavy metals elimination

Major Projects in FY89

1. Metals Speciation, Separation and Recovery
2. Absorption, Desorption of Air Pollutants
3. Pyrolization of Chlorinated Hydrocarbons
4. Separation and Reclamation of Inorganics Contained in Waste Streams

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	2
Annual Report:	November
Patents Issued in the Last 3 Years:	2

Other: 1 day workshops for industry

Networking Activities

Current Affiliations

- Clarkson University
- Vanderbilt University
- Illinois Institute of Technology, Research Institute
- The Center for Hazardous Waste Management

International Affiliations

- Institute Di Ricerca Sulle, Acque, Via Reno 1, CAP 00198, Roma, Italy

History

Date Founded: 1980

Founders: Illinois Institute of Technology; EPA

Reasons for Founding: To create an EPA Center of Excellence to solve the problem of waste elimination

Illinois, University of

Advanced Environmental Control Tech. Research Center
3230 Newmark C.E. Lab
208 N. Romine Street
Urbana, IL 61801

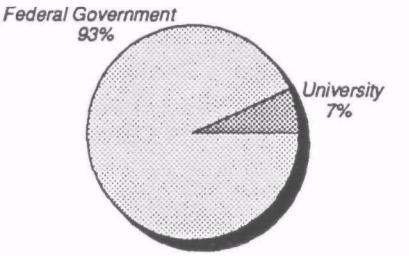
The Advanced Environmental Control Technology Research Center (AECTRC) was established under a cooperative agreement with EPA and the University of Illinois. The center focuses its research on separation technology, and contaminant detoxification and destruction as related to air and water pollution.

Director: R.S. Engelbrecht
Phone: (217)333-3822

Size and Scope

Number of Personnel:	22	FTEs:	10
Technical:	20	Administrative:	2
Background: PhDs:	8	MSs:	5

Sources of Funding for FY89



University: University of Illinois $60,000
Federal Government: EPA; Army Corps of Engineers $834,000

Services Provided

Major Areas of Expertise

- Separation technology
- Detoxification and destruction as related to air and water pollution

Current Activity Mix

- Basic Research 50%
- Applied Research 50%

Major Projects in FY89

1. Control of Toxicity in Expanded-Bed Anaerobic Reactors
2. Rates of Transfer in Biological Treatment
3. Development of Expanded-Bed GAC Anaerobic Reactors
4. Examination of Microbial Selection in GAC Biofilms
5. Fundamentals of Advanced Photograph Kinetics for Dechlorination

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Annual Report:	March

Networking Activities

Current Affiliations

- The center's advisory committee has members from: EPA Risk Reduction Engineering Lab
- University of Tennessee
- Research Triangle Institute
- Clemson University
- EPA
- Dupont Chemical
- Lehigh University

International Affiliations

- Trilateral training agreement between: University of Illinois, EPA, Japan Sewage Works Agency

History

Date Founded: 1979

Founders: University of Illinois; EPA

Reasons for Founding: To address relative problems associated with the technology of environmental quality control as related to the nation's air and water resources

Illinois, University of

Institute for Environmental Studies (IES)
1101 West Peabody
Urbana, IL 61801

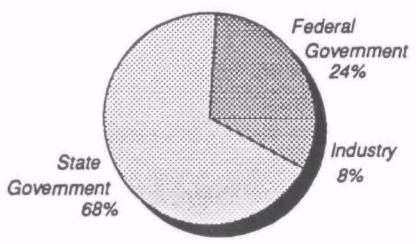
University of Illinois' Institute for Environmental Studies is an interdisciplinary academic unit organized to promote collaboration among scholars and to foster the study of the physical, biological and social environment and human interactions with that environment. The institute works with government and industry to provide the information necessary for successful planning and decision making.

Director: Roger A. Minear
Phone: (217)333-4178

Size and Scope

Number of Personnel:	40	FTEs:	13
Technical:	3	Administrative:	2
Background: PhDs:	38	MSs:	1

Sources of Funding for FY89



Federal Government: EPA; NSF; USAF . . $646,573
State Government $1,832,898
Industry: Monsanto; Kellogg; Batelle Memorial Institute $209,936

Services Provided

Major Areas of Expertise

- Environmental toxicology
- Environmental mutagens and carconagens
- Environmental chemistry
- Air quality
- Risk assessment
- Water resources

Current Activity Mix

- Basic Research
- Applied Research

Major Projects in FY89

1. Aluminum in Drinking Water
2. Aluminum Bioavailability in Rabbits
3. In Vitro Activation of Promutagens by Green Plants
4. Risk Assessment Model for Direct Acting Genotoxins
5. Atmospheric Chemistry of Po-218

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	1
Annual Report:	January
Courses Offered in 1989:	25

Networking Activities

Current Affiliations

- Illinois Hazardous Waste Information Center
- IES operates: Office of Solid Waste Research, Water Resources Center (WRC)
- WRC administers funds for Indiana Sea Grant Program

History

Date Founded: 1972
Founders: University of Illinois
Reasons for Founding: To create an interdisciplinary unit to foster collaboration among scholars

Iowa, University of

University Hygienic Laboratory
Oakdale Campus
Iowa City, IA 52242

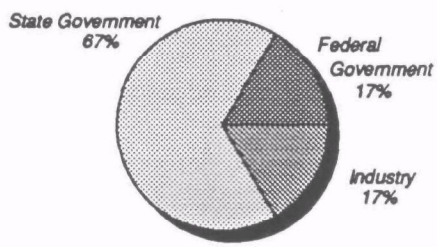
The University Hygienic Laboratory at the University of Iowa conducts research on disease control, environmental monitoring, and groundwater quality.

Director: W.J. Havsler, Jr.
Phone: (319)335-4500

Size and Scope

Number of Personnel:	150	FTEs:	141
Technical:	105	Administrative:	45
Background: PhDs:	8		

Sources of Funding for FY89



Federal Government	$1,000,000
State Government	$4,000,000
Industry	$1,000,000

Services Provided

Major Areas of Expertise
- Disease control
- Environmental monitoring
- Ground water quality

Current Activity Mix
- Applied Research 100%
- Unique Specialties: Laboratory assessment of AIDS virus

Major Projects in FY89

1. Organic Residues in Groundwater
2. Bio Markers of Environmental Insults
3. Standardization of HIV Reporting

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	2
Annual Report:	February

Networking Activities

Current Affiliations
- EPA
- Center for Disease Control

History

Date Founded: 1904
Founders: Iowa Legislature; University of Iowa

Kansas State University

EPA Hazardous Substance Research Center (HSRC)
Engineering Experiment Station
Durland Hall
Manhattan, KS 66506

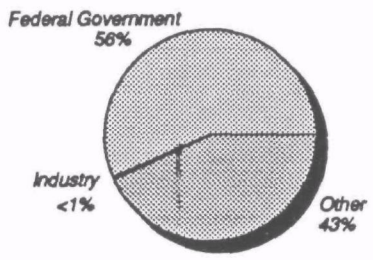
The Kansas State University EPA Hazardous Substance Research Center is a consortium of universities in Federal Regions 7 and 8. The center was established to conduct research on the identification, treatment, and reduction of hazardous substances resulting from agriculture, forestry, mining, mineral processing, and other activities of local interest.

Director: Larry Erickson
Phone: (913)532-5584

Size and Scope

Number of Personnel:	9	FTEs:	9
Technical:	7	Administrative:	5
Background: PhDs:	5		

Sources of Funding for FY89



Federal Government: EPA $2,000,000
Industry $10,000
Other: Consortium of Universities in EPA Regions 7 and 8 . . . . . $1,530,068

Services Provided

Major Areas of Expertise

- Analysis of hazardous substances from agriculture, forestry, mining, mineral processing and other sources

Current Activity Mix

- Basic Research 50%
- Applied Research 50%

Major Projects in FY89

1. Study of Heavy Metal Contamination of Surface and Ground Water resulting from Past Mining Operations
2. Study of Ground Water Contamination from Other Sources: Pesticides, Wood Preservatives, and Oil Refining
3. Hazardous Waste Minimization
4. Development of Incineration, Biodegradation and Immobilizaiton Technology
5. Experimental Study of Stabilization/Solidification of Hazardous Substances

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	3
Annual Report:	November
Courses Offered in 1989:	2

Networking Activities

Current Affiliations

- Consortium with Montana State University
- University of Iowa
- University of Missouri
- University of Montana
- University of Nebraska
- University of Utah

History

Date Founded: 1989
Founders: EPA; Kansas State University
Reasons for Founding: To conduct research pertaining to identification, treatment and reduction of hazardous substances

Kansas State University

Engineering Experiment Station
Durland Hall
Manhattan, KS 66506

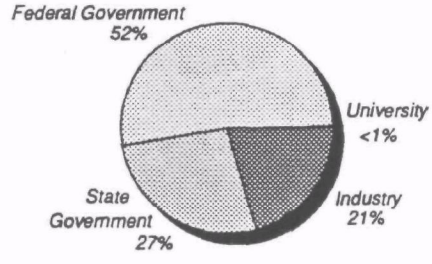
Kansas State University's Engineering Experiment Station was established to perform research of engineering and manufacturing value to the State of Kansas, and to collect and present technical information for the use of industry and the people of the state. The station's present scope encompasses research of national and international significance as well.

Director: Gale Simons
Phone: (913)532-5844

Size and Scope

Number of Personnel:	133	FTEs:	133
Technical:	125	Administrative:	8
Background: PhDs:	110	MSs:	23

Sources of Funding for FY89



University: Kansas State University $30,000
Federal Government $4,500,000
State Government $2,300,000
Industry $1,770,000

Services Provided

Major Areas of Expertise
- Environmental research
- Instrumentation and controls
- Advanced manufacturing
- Materials engineering
- Transportation research
- Electric power research

Current Activity Mix

• Basic Research	50%
• Applied Research	50%

Major Projects in FY89

1. Alleviating Drought Problems in Kansas and Drip Irrigation of Corn
2. Photo Thermal Beam Reflection Spectroscopy
3. Hazardous Substance Research
4. Advanced Manufacturing
5. Design and Characterization of Microprocessor Systems

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	12
Annual Report:	October
Patents Issued in the Last 3 Years:	12
Patent Licenses Issued in the Last 3 Years:	15

Other: Hotline: (800)332-0036 available to general public; radon contractor training

Networking Activities

Current Affiliations
- North Central Manufacturing Partnership

History

Date Founded: 1910
Founders: Kansas State University Board of Regents
Reasons for Founding: To perform research in engineering and manufacturing of value to the State of Kansas

Lamar University

Gulf Coast Hazardous Substance Research Center
P.O. Box 10613
Beaumont, TX 77710

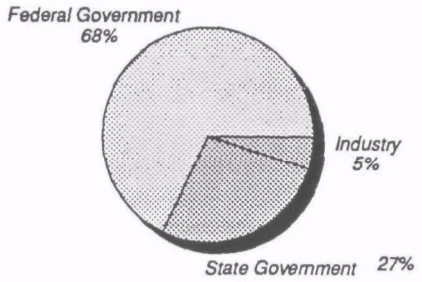
Lamar University's Gulf Coast Hazardous Substance Research Center combines work in the social and environmental science fields in order to better understand the full range of issues affecting waste cleanup. The center focuses research on waste minimization and treatment, and provides technical support.

Director: William Cawley
Phone: (409)880-8707

Size and Scope

Number of Personnel:	55	FTEs:	13
Technical:	50	Administrative:	2
Background: PhDs:	55		

Sources of Funding for FY89



Federal Government: EPA	$1,500,000
State Government	$600,000
Industry: Sandoz Crop Protection; Chemical Waste Management	$108,000

Services Provided

Major Areas of Expertise
- Waste minimization
- Innovative treatment
- Technological support

Current Activity Mix

• Basic Research	90%
• Applied Research	10%

Major Projects in FY89

1. Mechanisms of Solidification Stabilization
2. Data Collection on "Not In My Back Yard" Syndrome
3. Fate of Volatiles in Soils

Networking Activities

Current Affiliations
- Center is a consortium: University of Central Florida
- Mississippi State University
- University of Alabama
- Louisiana State University
- University of Texas
- Texas A&M University
- University of Houston

International Affiliations
- Chinese Academy, Institute of Power Management, 820, Building 813, Huangzhuang, Haidin District, Beijing, Peoples Republic of China

History

Date Founded: 1987
Founders: Lamar University
Reasons for Founding: Section 118C SARA Legislation

Lehigh University

Environmental Studies Center
Chandler-Ullman Building #17
Bethlehem, PA 18015

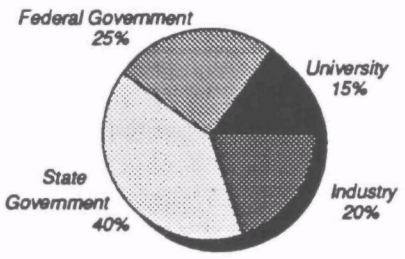
Lehigh University's Environmental Studies Center is a multidisciplinary research organization with the primary purpose of fostering research opportunitites in a broad range of environmental science and engineering fields. The center's staff includes faculty, graduate students, and technicians from the biology, chemistry, civil engineering, geological sciences, mechancial engineering, chemical engineering, economics, social relations, and urban studies departments.

Director: Irwin J. Kugleman
Phone: (215)758-3670

Size and Scope

Number of Personnel:	14	FTEs:	10
Technical:	13	Administrative:	1
Background: PhDs:	12		
BSs:	2		

Sources of Funding for FY89



University: Lehigh University	$150,000
Federal Government: EPA; DOC; DOE; DOI	$250,000
State Government: Equivalent state agencies	$400,000
Industry: Pfiser; Armstrong; Pennsylvania Power; Allegheny Power; small local industries .	$200,000

Services Provided

Major Areas of Expertise

- Ground water movement and pollution
- Surface water ecology
- Hazardous waste management
- Public policy

Current Activity Mix

• Basic Research	10%
• Applied Research	90%

Major Projects in FY89

1. Effects of Limestoning Acid Impacted Lakes
2. Study of the Ecology of Pollution Impacted Lakes
3. Concurrent Bacterial Denitrification and Nitrification in Biologically Waste Treated Soil Systems
4. Development of New Iron Exchanges for Treatment of Water and Waste
5. Treatment of Fish Processing Waste Water in Salt Marsh Systems

Technology Transfer Mechanisms/ Outreach Programs

Annual Report: Summer

History

Date Founded: 1962
Founders: Lehigh University
Reasons for Founding: Originally to solve marine problems; later to foster research opportunities on enviromental problems

Louisiana State University

Hazardous Waste Research Center
3418 Ceba Building
Baton Rouge, LA 70803

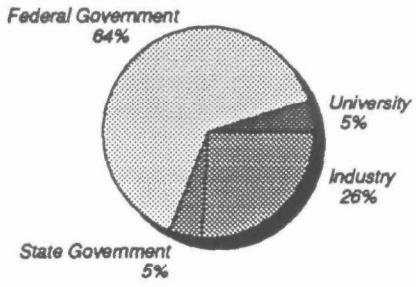
The Hazardous Waste Research Center at Louisiana State University focuses its research efforts on three main areas: destruction, separation and disposal of hazardous wastes. Through its Industry Associates Program, the center works directly with industry to help solve problems.

Director: Louis Thibodeaux
Phone: (504)388-6770

Size and Scope

Number of Personnel:	24	FTEs:	12
Technical:	18	Administrative:	6
Background: PhDs:	12	MSs:	12

Sources of Funding for FY89



University: Louisiana State University . . . $50,000
Federal Government: EPA; U.S. Air Force . $640,000
State Government: Department of Environmental Quality $50,000
Industry: Dow Chemical; Ethyl $260,000

Services Provided

Major Areas of Expertise

- Basic research in incineration
- Combustion
- Alternate methods of treatment destruction
- Interaction of waste constituents and natural media
- Industry associates applied research program
- Technology transfer program

Current Activity Mix

- Basic Research 50%
- Applied Research 50%
  Prototype Development
  Market Assessment
- Products or Processes Commercialized: Biodegradation of Dioxins and PCBs with Micro Masters Inc

Major Projects in FY89

1. Immobilization Mechanisms in Solidification Stabilization
2. Rotary Kiln Incineration
3. Detoxification of Dioxin Contaminated Sludges
4. Fate and Transport of Non Aqueous Phase Liquids in Soils
5. Air Stripping of Volatile Organics from Groundwater
6. Evaluation of the Mechanisms and Rate of Transport in Deep-Well Injection Strata

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1
Annual Report: Spring
Patents Issued in the Last 3 Years: 1
Patent Licenses Issued in the Last 3 Years: 1
Other: Seeking industry sponsors through mailing list, conferences, posters, publication in professional journals

Networking Activities

Current Affiliations

- Kansas State University Hazardous Substance Research Center
- Gulf Coast Hazardous Substance Resource Management Center, Lamar University
- North Carolina State University
- Pacific Basin Consortium

History

Date Founded: 1981
Founders: Elvin Dantin
Reasons for Founding: To create an EPA Center of Excellence to conduct hazardous waste research

Louisiana Universities Marine Consortium

Marine Consortium
Chauvin, LA 70344

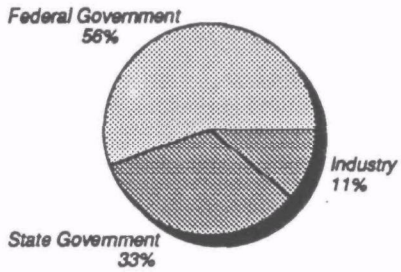
The Louisiana Universities Marine Consortium (LUMCON) provides coastal research facilities, research and education in the marine sciences, and public service for Louisiana's citizens. The challenge is to conserve and enhance traditional and underutilized resources, while understanding and abating threats to these resources resulting from the rapid deterioration of coastal wetlands and from pollutants.

Director: Donald Boesch
Phone: (504)851-2800

Size and Scope

Number of Personnel:	60	FTEs:	55
Technical:	38	Administrative:	7
Background: PhDs:	8	MSs:	6

Sources of Funding for FY89



Federal Government: U.S. Geological Survey; National Marine Fisheries Service; Minerals Management Service; NSF; NOAA. $2,500,000
State Government $1,500,000
Industry: Mid-Continent Oil and Gas; Battelle $500,000

Services Provided

Major Areas of Expertise

- Shoreline research
- Aquaculture
- Fisheries

Current Activity Mix

• Basic Research	60%
• Applied Research	40%

Major Projects in FY89

1. Shoreline Environmental Processes
2. Biological Production (food chain research)
3. Fisheries Development and Management
4. Impacts of Energy and Chemical Industries
5. Study of the Intersection of Mississippi River and Gulf of Mexico

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 5

Networking Activities

Current Affiliations

- Grambling State University
- Louisiana State University
- Louisiana Tech University
- McNeese State University
- Nicholls State University
- Northeast Louisiana University
- Northwestern State University
- Southeastern Louisiana University
- Southern University Agricultural and Mechanical College
- University of New Orleans
- University of Northwestern Lousiana

History

Date Founded: 1979
Founders: State of Louisiana
Reasons for Founding: To facilitate research by Louisiana Universities in broad range of marine sciences

Maryland, University of

Sea Grant College
1224 H.J. Patterson Hall
College Park, MD 20742

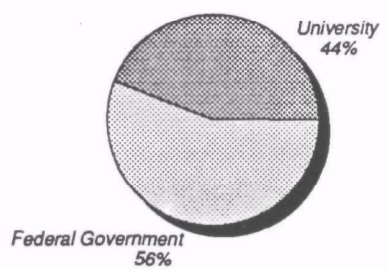
The University of Maryland's Sea Grant College centers its research on the many complex environmental problems facing the Chesapeake Bay region. Of primary concern are fisheries, aquaculture and coastal policy.

Director: John Greer
Phone: (301)454-5690

Size and Scope

Number of Personnel:	22	FTEs:	22
Technical:	14	Administrative:	8
Background: PhDs:	7	MSs:	7

Sources of Funding for FY90



University: University of Maryland . . . $1,500,000
Federal Government: NSF; NOAA; EPA . $1,900,000

Services Provided

Major Areas of Expertise

- Fisheries
- Aquaculture
- Coastal policy
- Economics of fisheries

Current Activity Mix

• Basic Research	50%
• Applied Research	50%

Major Projects in FY89

1. Causes of Low-Dissolve Oxygen in Chesapeake Bay
2. Genetic Engineering of Shellfish
3. Biology of Recruitment in Chesapeake Bay (Oysters, Rockfish and Crabs)
4. Biological Filter Design for Crab Shedding and Aquaculature
5. Influence of Absorbed Pollutants on Oyster Set and Survival

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	2
Patents Issued in the Last 3 Years:	2

Networking Activities

Current Affiliations

- Maryland Biotechnology Institute
- NASA
- NOAA
- Johns Hopkins University
- Academy of Natural Sciences

History

Date Founded: 1977
Founders: Dr. R. Colwell; University of Maryland
Reasons for Founding: To create a Sea Grant College at the University of Maryland

Massachusetts Institute of Technology

Center for Environmental Health Sciences
77 Massachusetts Avenue
Building E-18, Room 666
Cambridge, MA 02139

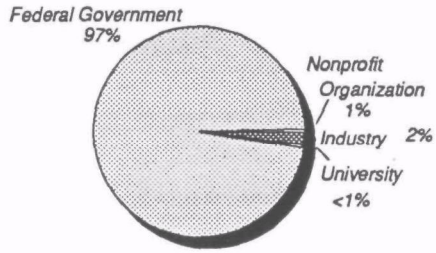
Massachusetts Institute of Technology's Center for Environmental Health Sciences is a consortium of faculty with special knowledge of food chemistry, combustion, waste storage, and toxicology. Research at the center is focused on the discovery of agents in our environment responsible for genetic changes in humans.

Director: William G. Thilly
Phone: (617)253-6220

Size and Scope

Number of Personnel:	68	FTEs:	68
Technical:	64	Administrative:	4
Background: PhDs:	46	MSs:	22

Sources of Funding for FY89



University: Massachusetts Institute of Technology $30,000
Federal Government: DOE; NIH $6,447,836
Industry: Centocor $129,824
Nonprofit Organization: Rockefeller Foundation $36,000

Services Provided

Major Areas of Expertise

- Combustion and incineration research
- Environmental fate and transport
- Analytical chemistry
- Bio-benetics and toxicology

Current Activity Mix

- Basic Research 100%
- Products or Processes Commercialized: Gentest, Mutational Spectra

Major Projects in FY89

1. Destruction of Chlorinate Hydrocarbons in Toxic Waste and Incineration Processes
2. Feasibility Studies on the Analysis of Mutational Spectra from Indigenous Bacteria at Contaminated Sites
3. Analysis of 265 RNA Sequences in Natural Populations
4. Measurement of Present Day Fluxes of Solvents and Toxic Inorganic Species in Surface Waters of the Abertuna Watershed

Technology Transfer Mechanisms/ Outreach Programs

Patents Issued in the Last 3 Years:	12

Networking Activities

Current Affiliations

- University of Vermont Medical School
- University of California, Berkeley, Program in Superfund Basic Research
- National Institute of Environmental Health Sciences

International Affiliations

- University of Quebec, Institute Armand Frappier, Quebec, Canada
- Karolinska University, Stockholm, Sweden

History

Date Founded: 1978
Founders: Massachusetts Institute of Technology
Reasons for Founding: Received a National Institute of Environmental Health Sciences grant to study combustion pollution

Massachusetts Institute of Technology

Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics
Room 48-311
Cambridge, MA 02139

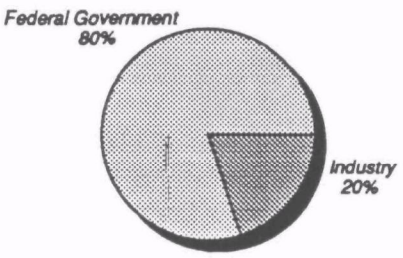
Massachusetts Institute of Technology's Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics does extensive research on environmental engineering with an emphasis on hydrodynamics of waves and currents. The laboratory also does work on modeling techniques for the optimal management of water resource systems.

Director: Raphael L. Bras
Phone: (617)253-2726

Size and Scope

Number of Personnel:	85	FTEs:	85
Technical:	73	Administrative:	12
Background: PhDs:	15	MSs:	70

Sources of Funding for FY89



Federal Government: NSF; NOAA . . . $3,360,000
Industry $840,000

Services Provided

Major Areas of Expertise
- Environmental engineering
- Water resources
- Coastal engineering
- Hydrodynamics

Current Activity Mix

• Basic Research	75%
• Applied Research	25%

Major Projects in FY89

1. Wave Bottom Boundary Layer Dynamics
2. Sorption of Organics by Particles
3. Stochastic Theories of Subsurface Solute Transport
4. Impact of Acid Precipitation on Reserviors
5. Estimation of Soil Properties from Landsat Images of Vegetation

Technology Transfer Mechanisms/ Outreach Programs

Annual Report:	January
Courses Offered in 1989:	30

Networking Activities

Current Affiliations
- Woods Hole Oceanographic Institute

International Affiliations
- University of Florence National Research Council, Rome, Italy

History

Date Founded: 1950
Founders: Massachusetts Institute of Technology
Reasons for Founding: To study hydrodynamics

Miami University

Institute of Environmental Sciences
Oxford, OH 45056

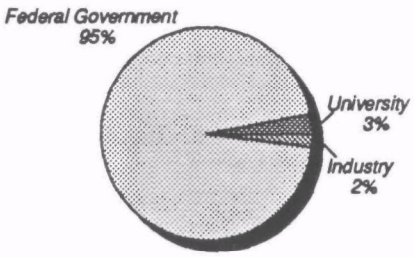
Miami University of Ohio's Institute of Environmental Sciences emphasizes a systematic and interdisciplinary approach to environmental issues and the effective communication of knowledge and information. The center stresses problem solving and the ability to work in and lead interdisciplinary teams and to work with government officials, business leaders, and the public.

Director: Gene E. Willeke
Phone: (513)529-5811

Size and Scope

Number of Personnel:	17	FTEs:	6
Technical:	15	Administrative:	2
Background: PhDs:	3	MSs:	1
BSs:	8		

Sources of Funding for FY89



University: Miami University $90,000
Federal Government: EPA; DOE; NSF; Army Corps of Engineers $2,850,000
Industry $60,000

Services Provided

Major Areas of Expertise

- Terrestrial and aquatic ecology
- Hazardous and toxic substances
- Dispute resolution
- Water resources planning and management

Current Activity Mix

- Applied Research 100%

Major Projects in FY89

1. River Restoration
2. Treatment Technology for Hazardous and Toxic Substances
3. Stress Ecology
4. Ground Source Heat Pumps
5. Environmental Impacts of Coca Cultivation

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	3
Courses Offered in 1989:	8

Networking Activities

Current Affiliations

- Central States Universities, Inc.
- Greater Cincinnati Consortium
- Ohio River Basin Consortium for Education and Research
- Southwest Ohio Consortium

International Affiliations

- University of Glasgow, Scotland
- Vienna University of Economics, Austria

History

Date Founded: 1969
Founders: D. Baldwin, G. Barrett, R. Wilson
Reasons for Founding: To respond to a broad range of environmental concerns

Miami, University of

Clean Energy Research Institute
P.O. Box 248294
Coral Gables, FL 33124

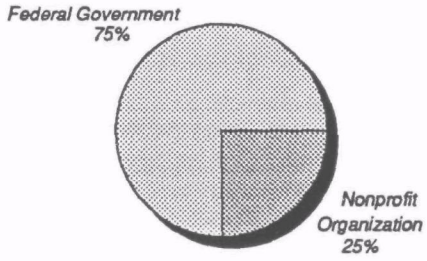
University of Miami's Clean Energy Research Institute serves as the focal point of energy related activities at the university, conducting research on solar energy, ocean thermal energy, hydrogen energy, conservation, multi-phase flows and heat transfer, and renewable energy sources. The institute also organizes seminars, workshops, short courses, symposia and conferences, and supports other university departments, other academic institutions, government and private organizations.

Director: T. Nejat Veziroglu
Phone: (305)284-4666

Size and Scope

Number of Personnel:	30	FTEs:	30
Technical:	24	Administrative:	6
Background: PhDs:	13	MSs:	12
BSs:	5		

Sources of Funding for FY89



Federal Government: NSF; EPA $750,000
Nonprofit Organization: Dejour Foundation; Hemispheric Foundation $250,000

Services Provided

Major Areas of Expertise
- Energy problems
- Hydrogen energy research
- Solar energy
- Synthetic fuels.

Current Activity Mix

• Basic Research	50%
• Applied Research	50%
Prototype Development	

Major Projects in FY89

1. Hydrogen Energy Research: To Provide Fossil Fuel Alternatives
2. Air Pollution Control
3. Solar Heating and Cooling
4. Solar Collector Testing

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	2
Annual Report:	January
Courses Offered in 1989:	1

Networking Activities

Current Affiliations
- Florida Solar Energy Center
- Texas A&M Hydrogen Research Center
- Hawaii National Resource Center

History

Date Founded: 1974
Founders: Dr T. Nejat Veziroglu
Reasons for Founding: To address the energy crisis and pollution problems

Michigan State University

Center for Environmental Toxicology
C-231 Holden Hall
East Lansing, MI 48824

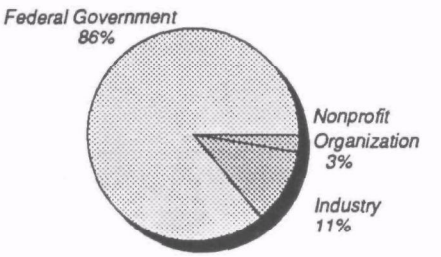
The Center for Environmental Toxicology was established at Michigan State University to bring MSU's knowledge to bear on problems of environmental pollution in the State of Michigan. The center is a clearing house for information and research on toxics in the environment. The center can mobilize scientific expertise to assess contamination of livestock with pesticides or other pollutants.

Director: Lawrence Fischer
Phone: (517)353-6469

Size and Scope

Number of Personnel:	70	FTEs:	15
Technical:	13	Administrative:	2
Background: PhDs:	13	MSs:	2

Sources of Funding for FY89



Federal Government: EPA; National Institute of Environmental Health Sciences; USDA . . . $1,700,000
Industry: Dow Chemical; Michigan Oil and Gas $225,000
Nonprofit Organization: C.S. Mott Foundation . $50,000

Services Provided

Major Areas of Expertise
- Toxicology

Current Activity Mix

• Basic Research	50%
• Applied Research	50%

Major Projects in FY89

1. Food Toxicology Research (Analysis of Microtoxins)
2. Bioassay of Toxicology in Fish and Wildlife
3. Hazardous Substance Research

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	2

Networking Activities

Current Affiliations
- EPA Hazardous Substance Regional Center
- Hazardous Materials Management Consortium

History

Date Founded: 1978
Founders: State of Michigan
Reasons for Founding: To coordinate rapid scientific response to chemical contamination in Michigan

Michigan State University

Institute of Water Research
334 Natural Resources Building
East Lansing, MI 48823

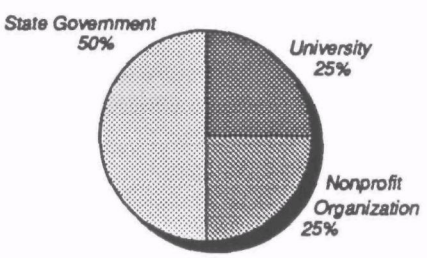
Michigan State University's Institute of Water Research is responsible for aiding in the coordination of research and educational programs on surface and groundwater quality and quantity in the state. The institute administers Michigan Sea Grant College projects and the Inland Lakes Research and Study Center.

Director: Jon F. Bartholic
Phone: (517)353-3742

Size and Scope

Number of Personnel:	17	FTEs:	14
Technical:	13	Administrative:	4
Background: PhDs:	2	MSs:	7
BSs:	4		

Sources of Funding for FY89



University	$250,000
State Government	$500,000
Nonprofit Organization	$250,000

Services Provided

Major Areas of Expertise

- Technology transfer
- Groundwater and surface water quality
- Modeling

Current Activity Mix

- Applied Research 100%
  Prototype Development
- Unique Specialties: Modeling for user friendly analysis

Major Projects in FY89

1. The Effect of Water Level Changes on the Economic Value and Biological Function of Great Lakes Coastal Wetlands
2. Hydrogeological and Hydrogeochemical Characterization and Implication for Consumptive Use of a Large Glacier Drift Aquifer System in Southwest Michigan
3. Vertical Fracture Systems in Glacial Till and the Susceptibility of Buried Aquifers to Surface Derived Contaminents
4. Upgrading Microcomputer Workstation for Disseminating Groundwater Information to Local Decision Makers
5. A Basic Local-Level Water Resource Data Base

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	6
Annual Report:	April
Other	Books and articles

Networking Activities

Current Affiliations

- U.S. Geological Survey
- Wayne State University
- Western Michigan University
- Michigan Department of Natural Resources
- Michigan Department of Public Health
- Groundwater Education in Michigan, (GEM) sponsored by the Kellogg Foundation

History

Date Founded: 1961
Founders: U.S. Geological Survey
Reasons for Founding: To coordinate programs and conduct research in areas concerning surface and groundwater contamination

Michigan State University

Pesticide Research Center
107 Pesticide Research Center
Michigan State University
East Lansing, MI 48824 1131

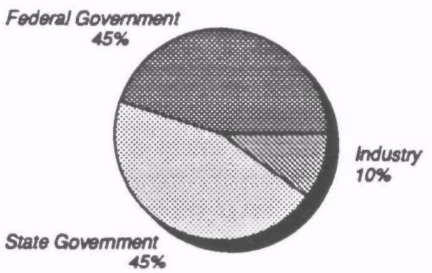
Michigan State University's Pesticide Research Center was established to permit interdisciplinary research on extremely complex and interlocking problems. Michigan's extensive and highly diversified agriculture demanded effective pest control, while the State's equally extensive natural resources — its lakes, rivers and forests and all their natural inhabitants — demanded protection. In 1974 the U.S. Department of Agriculture named the center one of four "leader" laboratories in the U.S.

Director: Robert M. Hollingworth
Phone: (517)353-9430

Size and Scope

Number of Personnel:	95	FTEs:	30
Technical:	90	Administrative:	5
Background: PhDs:	18	MSs:	20

Sources of Funding for FY89



Federal Government: USDA; EPA; FDA;
NIH $2,250,000
State Government $2,250,000
Industry $500,000

Services Provided

Major Areas of Expertise

- Biochemical toxicology
- Animal toxicology
- Environmental chemistry
- Electron optics
- Biophysical studies

Current Activity Mix

- Basic Research 40%
- Applied Research 60%
  - Prototype Development
  - Market Assessment
- Products or Processes Commercialized: LISA Immuno Assay System

Major Projects in FY89

1. Fundamental and Applied Aspects of Biology and Control of Economic Pests
2. Distribution, Chemistry and Ecology of Pesticides in Soils and in Terrestrial and Aquatic Environments
3. Contamination of Foods and Feeds
4. Modes of Entry and the Metabolism, Physiology and Toxicology of Pesticides in Plant, Animal and Microbial Systems

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1
Other: Cooperative extension service

History

Date Founded: 1965
Founders: Dr. Gordon Guyer
Reasons for Founding: To protect Michigan's farms and wildlife

Michigan, University of

Great Lakes and Mid Atlantic EPA Hazardous Substance Research Center (HSRC)
Department of Civil Engineering
2340 G.G. Brown Building
Ann Arbor, MI 48109 2125

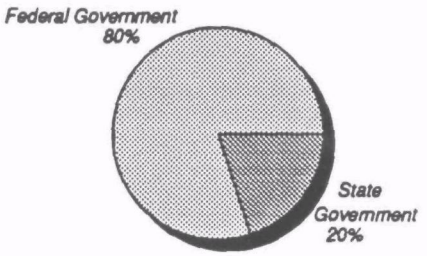
The Great Lakes and Mid-Atlantic EPA Hazardous Substance Research Center (HSRC) at the University of Michigan concentrates its research on biological degradation, bioreactors, surface agents, and on-site cleanup.

Director: Walter J. Weber, Jr.
Phone: (313)763-2274

Size and Scope

Number of Personnel:	10	FTEs:	8
Technical:	3	Administrative:	7
Background: PhDs:	3		

Sources of Funding for FY89



Federal Government: EPA $1,000,000
State Government $250,000

Services Provided

Major Areas of Expertise

- Biological degradation processes for organic hazardous substances
- Bioreactors
- Surface agents
- On-site contamination cleanup

Current Activity Mix

- Basic Research 80%
- Applied Research 20%
- Unique Specialties: Multidisciplinary Research

Major Projects in FY89

1. Microbial Phenomena Responsible for Degrading a Pollutant Compound
2. Chemical Characteristics of Pollutants
3. Design and Operation of Laboratory Scale Treatment Systems
4. Reductive Dechlorination
5. Volatile Organic Compound Degradation

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 3
Annual Report: October
Other: June 1991 meeting of all 5 EPA Regional Hazardous Substance Research Centers

Networking Activities

Current Affiliations

- Michigan State University and Howard University
- EPA Regional Hazardous Substance Research Centers
- Superfund Center; National Waste-Reduction Foundation

History

Date Founded: 1989
Founders: EPA
Reasons for Founding: To create EPA Hazardous Research Center

Michigan, University of

Institute of Environmental and Industrial Health
School of Public Health
109 South Observatory, Room 1518
Ann Arbor, MI 48109

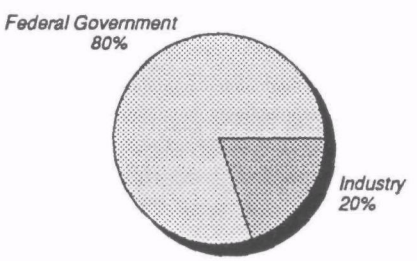
University of Michigan's Institute of Environmental and Industrial Health combines research in three major areas: environmental health sciences (air quality, environmental chemistry, environmental health management, hazardous waste, radiological health, water quality), occupational health (industrial hygiene, occupational medicine), and toxicology. Instrumentation and facilities include: dosimeter exposure chambers, radiation detection equipment, spectrophotometers, ultra centrifuges, vacuum evaporators and an electron microscopy facility.

Director: Robert Gray
Phone: (313)764-3188

Size and Scope

Number of Personnel:	28	FTEs:	25
Technical:	27	Administrative:	1
Background: PhDs:	27		

Sources of Funding for FY89



Federal Government: EPA; FDA; DOD; NIH $3,200,000
Industry: Dow Chemical; General Motors;
Ford Motor $800,000

Services Provided

Major Areas of Expertise

- Industrial hygiene
- Environmental health (air pollution, water quality, tixicity, neurotoxicity)
- Computer modeling on air and water problems
- Pathology

Current Activity Mix

- Basic Research 25%
- Applied Research 75%
- Prototype Development

Major Projects in FY89

1. Research on Ergonomics
2. Research on Toxicology

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 4
Annual Report: Fall - Biannual
Patent Licenses Issued in the Last 3 Years: 1

History

Date Founded: 1951
Founders: General Motors Corporation
Reasons for Founding: To facilitate studies on occupational disease and occupational health; original funding: $10,000, by General Motors

Michigan, University of

Michigan Sea Grant College Program
2200 Bonisteel Blvd.
Ann Arbor, MI 48109

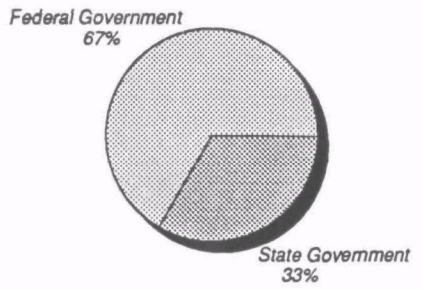
University of Michigan's Michigan Sea Grant College Program, a state cooperative program of the university and Michigan State University, is part of a national network of programs offering marine-related research, education and advisory services. Among other accomplishments, Michigan's program has revolutionized cold water drowning rescue techniques, established underwater parks, developed low-cost shore protection measures, and trained U.S. shipbuilders.

Director: Michael Parsons
Phone: (313)763-1437

Size and Scope

Number of Personnel:	80	FTEs:	55
Technical:	68	Administrative:	12
Background: PhDs:	30	MSs:	38

Sources of Funding for FY89



Federal Government: NOAA; U.S. Coast Guard $1,000,000
State Government $500,000

Services Provided

Major Areas of Expertise

- Coastal processes; environmental studies; living resources; marine transportation; economics of pollution

Current Activity Mix

- Basic Research 40%
- Applied Research 60%
- Unique Specialties: Marine transportation and engineering

Major Projects in FY89

1. Coast Guard Vessel Research
2. Immune Response in Great Lakes Fish Eaters
3. Lake Sturgeon Program
4. Lake Level Changes (Impact on Shoreline Development)
5. Impact of TCDD (a dioxin isomer) on the Reproduction of Rainbow Trout

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 10

Networking Activities

Current Affiliations

- U.S. Sea Grant Programs
- Great Lakes (Regional) Sea Grant Programs
- Michigan State University (Joint Manager of Michigan Sea Grant)

History

Date Founded: 1969
Founders: U.S. Congress
Reasons for Founding: National Sea Grants Program

Nevada, University of

Desert Research Institute
P.O. Box 60220
Reno, NV 89506

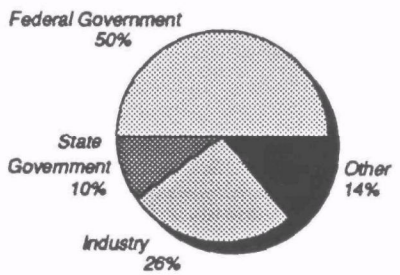
University of Nevada's Desert Research Institute has developed from a basic focus on arid land problems to include atmospheric physics and air resources; quality and quantity constraints on water resources; influences of arid environments on the physiology of desert plants; environmental impacts of power generation and energy-related engineering science; and social and technological developments of man in arid lands.

Director: James V. Taranik, President
Phone: (702)673-7300

Size and Scope

Number of Personnel:	290	FTEs:	250
Technical:	250	Administrative:	40
Background: PhDs:	45	MSs:	74

Sources of Funding for FY89



Federal Government: DOE; NOAA; NSF; DOD; NASA; DOI $8,000,000
State Government $1,600,000
Industry: Southern California Edison; Nevada Power $4,160,000
Other: Nevada county governments . . . $2,240,000

Services Provided

Major Areas of Expertise

- Atmospheric physics
- Water quality and quantity
- Environmental impact
- Archaeology
- Hazardous waste detection and monitoring
- Air quality

Current Activity Mix

- Basic Research 40%
- Applied Research 60%
  Prototype Development
- Products or Processes Commercialized: Laser tranmisometer

Major Projects in FY89

1. Transport of Radio Nucleides in Groundwater
2. Desert Mountain Air Transport
3. Source Reception Modeling of Urban Air Quality Problems

Technology Transfer Mechanisms/ Outreach Programs

Annual Report:	Spring
Patents Issued in the Last 3 Years:	1

Networking Activities

Current Affiliations

- Operates: Atmospheric Sciences Center
- Biological Sciences Center
- Energy and Environmental Engineering Center
- Quaternary Sciences Center, Water Resources Center
- NOAA's Western Regional Climate Center

History

Date Founded: 1959
Founders: Nevada State Legislature
Reasons for Founding: To study environmental problems associated with arid climates

Nevada, University of (Las Vegas)

Environmental Research Center
4505 Maryland Parkway
Las Vegas, NV 89154

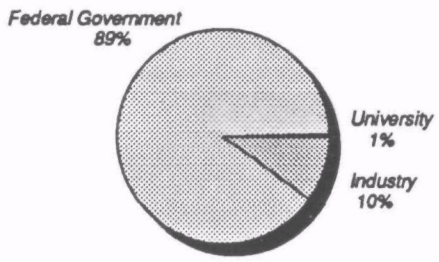
University of Nevada, Las Vegas' Environmental Research Center runs a broad variety of programs that require the focus of extensive experience, expertise and resources. The center conducts environmental monitoring studies, human exposure assessments, cultural resource inventories, geothermal potential assessments, and monitoring methods and systems development, in providing technical support, and in the operation of a national referee quality assurance laboratory.

Director: Delbert Barth
Phone: (702)739-3382

Size and Scope

Number of Personnel:	61	FTEs:	60
Technical:	49	Administrative:	12
Background: PhDs:	29	MSs:	12

Sources of Funding for FY89



University: University of Nevada, Las Vegas $30,000
Federal Government: EPA; DOE; DOI $5,370,000
Industry: Electric Power Research Institute $600,000

Services Provided

Major Areas of Expertise

- Environmental monitoring
- Impact assessment
- Limnological research
- Earth sciences
- Environmental assessment
- Quality assurance
- Technical support

Current Activity Mix

- Applied Research 100%
- Unique Specialties: Statistical modeling

Major Projects in FY89

1. Geothermal Fluid Genesis in the Great Basin of Nevada
2. Optical Remote Sensing for Environmental Measurements
3. Effects of Large-Scale Fertilization (Lake Mead)
4. Diurnal Monitoring of Lake Mead
5. Archaeological Site File Update (Southern Nevada)

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 7

Networking Activities

Current Affiliations

- Cooperative Agreement with EPA on Environmental Monitoring Systems Laboratory

International Affiliations

- Centro Hondureno Para La Investigacion De Recursos Aquaticos, Santa Cruz De Yojoa Cortez, Honduras

History

Date Founded: 1981
Founders: Museum of Natural History at the University of Nevada
Reasons for Founding: To study a broad range of environmental concerns

New Hampshire, University of

Complex Systems Research Center
Science and Engineering Research Building
Durham, NH 03824

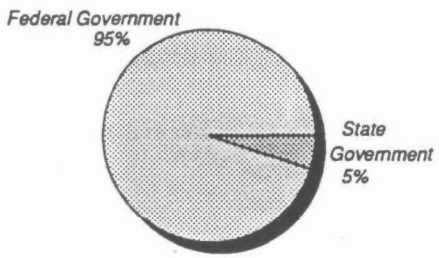
University of New Hampshire's Complex Systems Research Center specializes in computer modeling, atmospheric gas studies, acid rain research, forest and land degradation, and global data sets. Extensive data bases are maintained on global vegetation, soils, climate, rivers, economics and energy. The center is closely affiliated with the university's Institute for the Study of Earth, Ocean and Space.

Director: John Aber
Phone: (603)862-1792

Size and Scope

Number of Personnel:	40	FTEs:	20
Technical:	37	Administrative:	3
Background: PhDs:	11		

Sources of Funding for FY89



Federal Government: NASA; NSF; DOE; EPA $1,140,000
State Government $60,000

Services Provided

Major Areas of Expertise

- Computer modeling, atmospheric gas studies
- Acid rain research
- Forest and land degradation
- Global data sets

Current Activity Mix

• Basic Research	50%
• Applied Research	50%
Prototype Development	
• Unique Specialties: Use of global data sets	

Major Projects in FY89

1. Effects of Ocean Circulation and Land Use on Atmospheric CO_2 Content
2. Exchanges of Trace Gases Over Remote Areas
3. Assessment and Implications of Acid Deposition in North East Forests

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	1

Networking Activities

Current Affiliations

- Institute for Study of Earth, Ocean and Space at University of New Hampshire
- Woods Hole Oceanographic Institute
- NASA

History

Date Founded: 1979
Founders: University of New Hampshire
Reasons for Founding: To study environmental concerns in New Hampshire and surrounding states

New Jersey Institute of Technology

Hazardous Substance Management Research Center (HSMRC)
138 Warren Street
Newark, NJ 07102

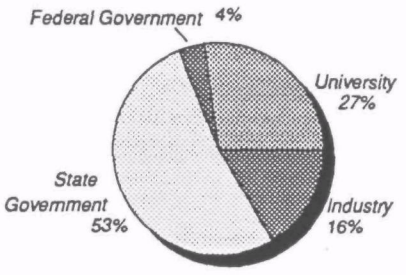
New Jersey Institute of Technology's Hazardous Substance Management Research Center (HSMRC) is a consortium of five universities in Superfund Regions I and II. The center is funded in part by a corporate membership of over 30 companies who direct the research activities of the organization.

Director: Richard Magee
Phone: (201)596-3006

Size and Scope

Number of Personnel:	70	FTEs:	35
Technical:	67	Administrative:	3
Background: PhDs:	56	MSs:	14

Sources of Funding for FY89



University: N.J. Institute of Technology	$1,500,000
Federal Government: NSF	$220,000
State Government: New Jersey Commission on Science and Technology	$2,900,000
Industry: Exxon; Amoco; Ciba Geigy; AT&T	$900,000

Services Provided

Major Areas of Expertise

- Incineration
- Biochemical treatment
- Physical treatment
- On-site assessment
- Health effects
- Public policy and education

Current Activity Mix

• Basic Research	50%
• Applied Research	50%

Major Projects in FY89

1. In Situ Microbial Treatment and Attenuation of Groundwater Contaminants
2. Vadose Zone Contaminant Removal by Pneumatic Fracturing
3. Organic/Inorganic Oxidation for Nox Control
4. Anaerobic Treatment of Halogenated Organic Compounds
5. Microwave Energy Treatment of Hazardous Wastes

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Annual Report:	October
Patents Issued in the Last 3 Years:	1

Networking Activities

Current Affiliations

- Northeast Hazardous Substance Research Center

International Affiliations

- Elf Aquitain, (French Company) 620 York Road, Sommerville, New Jersey, 08876

History

Date Founded: 1984

Founders: New Jersey Institute of Technology; Princeton University; Rutgers University; Stevens Institute of Technology

Reasons for Founding: Center received grants from Exxon and Cyanamid, then approached NSF to become a Center of Excellence for Superfund region I and II

New Jersey Institute of Technology

Institute for Hazardous and Toxic Substance Management
Newark, NJ 07102

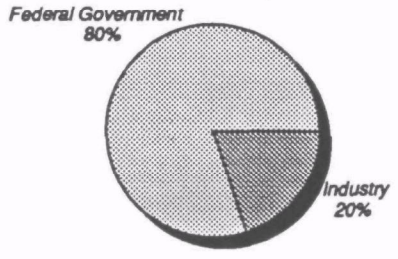
New Jersey Institute of Technology's Institute for Hazardous and Toxic Substance Management aids industry in developing new products and processes through minimization techniques and treatment technologies for hazardous waste, to provide the necessary technological base to identify and remediate hazardous substance spills and burial sites, to facilitate the exchange of ideas and knowledge among industry, government, academia and the public.

Director: John Liskowitz
Phone: (201)596-3673

Size and Scope

Number of Personnel:	2	FTEs:	2
Technical:	0	Administrative:	2
Background: PhDs:	2		

Sources of Funding for FY89



Federal Government: NSF; EPA	$800,000
Industry	$200,000

Services Provided

Major Areas of Expertise

- Hazardous substances: incineration
- Biological and chemical treatment
- Physical treatment
- Site assessment and remediation
- Public policy and education
- Academic focus one-on-one projects

Current Activity Mix

- Applied Research 100%
  Market Assessment

Major Projects in FY89

1. Waste Solidification and Stabilization
2. Ash Utilization
3. Waste Management Strategies

Networking Activities

Current Affiliations

- E-Tech Cooperative Agreement with EPA for Hazardous Waste Research
- Hazardous Waste Advisory Council

International Affiliations

- Alberta Environmental Center, Bag 4000, Vagerville, Alberta, Canada
- Imperial College, London, England
- Hazardous Substance Research Center, Lyon, France

History

Date Founded: 1982

Founders: New Jersey Institute of Technology; Princeton; Stevens Institute of Technology; UMD New Jersey

Reasons for Founding: To create a comprehensive program for education and research on hazardous wastes

New Mexico State University

Waste Management and Research Consortium (WERC)
Department of Chemical Engineering
Box 30001, Dept. 3805
Las Cruces, NM 88003

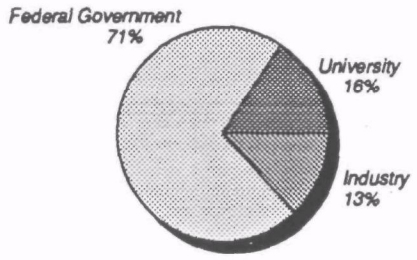
The Waste Management and Research Consortium at New Mexico State University was established to address issues associated with management of hazardous, radioactive and solid waste. The consortium operates a waste isolation pilot plant.

Director: Ron K. Bhada
Phone: (505)646-1214

Size and Scope

Number of Personnel:	100	FTEs:	65
Technical:	97	Administrative:	3
Background: PhDs:	50	MSs:	30
BSs:	17		

Sources of Funding for FY90



University: New Mexico State University	$1,200,000
Federal Government: DOE	$5,400,000
Industry	$1,000,000

Services Provided

Major Areas of Expertise

- Educational and research programs
- Technological transfer
- Satellite TV (additional technological transfer)

Current Activity Mix

- Basic Research 30%
- Applied Research 70%
  - Prototype Development
  - Market Assessment
- Unique Specialties: Waste isolation pilot plant; Integrated research and education; satellite technology

Major Projects in FY89

No projects so far, center is new

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Annual Report:	February

Networking Activities

Current Affiliations

- University of New Mexico
- New Mexico Institute of Mining and Technology
- Sandia and Los Alamos National Laboratories
- DOE

History

Date Founded: 1989

Founders: Ron K. Bahda

Reasons for Founding: To bring education and research at the university and its affiliates to bear on the practical problems of industry

New Orleans, University of

Urban Waste Management and Research Center
College of Engineering
New Orleans, LA 70148

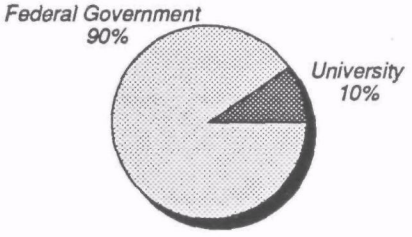
Director: Kenneth McMannis
Phone: (504)286-6271

The Urban Waste Management and Research Center at the University of New Orleans was founded in 1990. Currently the center is building its research infrastructure. The focus will be on municipal waste problems.

Size and Scope

Number of Personnel:	7	FTEs:	4
Technical:	0	Administrative:	7
Background: PhDs:	7		

Sources of Funding for FY90



University:	$235,000
Federal Government: EPA	$2,200,000

Services Provided

Major Areas of Expertise

- The Waste Management and Research Center at the University of New Orleans is a new center. Its focus is research on all aspects of municipal waste.

Major Projects in FY90

1. Building Center's Infrastructure
2. Training Water and Waste Water Plant Operators
3. Effects of Sulfides on the Anaerobic Treatment Process
4. Development of Immuno Assay for Detection of Environmental Chemicals

History

Date Founded: 1990
Founder University of New Orleans
Reasons for founding To address municipal waste problems

New York University

Institute of Environmental Medicine
550 First Avenue
New York, NY 10016

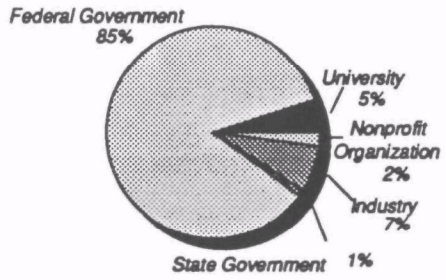
The Institute of Environmental Medicine at New York University is principally a training unit for students of environmental toxicology. The institute addresses a broad spectrum of problems in environmental health ranging from radiation effects to arteriosclerosis, respiratory disorders, and other environmentally related diseases.

Director: Arthur Upton
Phone: (212)340-5280

Size and Scope

Number of Personnel:	200	FTEs:	200
Technical:	180	Administrative:	20
Background: PhDs:	85		

Sources of Funding for FY89



University: New York Universtiy	$725,000
Federal Government: DOE; EPA; NASA; HHS	$12,325,000
State Government	$145,000
Industry: Consolidated Edison; Mobil	$1,015,000
Nonprofit Organization: The Dana Foundation	$290,000

Services Provided

Major Areas of Expertise
- Environmental toxicology
- Epidemiology
- Genetic toxicology
- Chemical fate and transport

Current Activity Mix
- Basic Research
- Applied Research
  Prototype Development

Major Projects in FY89

1. Effects of Irritants on Living Defense Function
2. Effects of Atmospheric Pollution on Human Health
3. Anaerobic Biodegradation of Toxic Aromatic Compounds
4. Uranium Metabolic Modeling
5. High Efficiency Gamma/X-Ray Imaging Detector Development

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	1
Annual Report:	May
Courses Offered in 1989:	30
Patents Issued in the Last 3 Years:	5

History

Date Founded: 1948
Founders: New York University
Reasons for Founding: N/A

New York, State University of (Buffalo)

Center for Hazardous Waste Management
207 Jarvis Hall
Buffalo, NY 14260

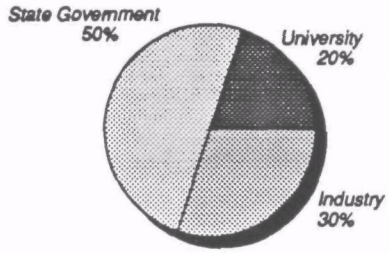
SUNY Buffalo's New York State Center for Hazardous Waste Management was established by state law to coordinate research and development in the areas of hazardous wastes. The center is dedicated to research on hazardous waste reduction, waste recovery, recycling and reuse, state of the art waste destruction, and the phasing out of land disposal.

Director: Ralph Rumer
Phone: (716)636-3446

Size and Scope

Number of Personnel:	73	FTEs:	10
Technical:	40	Administrative:	3
Background: PhDs:	42	MSs:	30

Sources of Funding for FY89



University: Consortium: Cornell University; Syracuse University; New York University; Manhattan College; State University of New York, Buffalo and Stony Brook; Rensselaer Polytechnic Institute; Clarkson University $820,000
State Government: Department of Environmental Conservation $2,050,000
Industry: Occidental Chemical; General Electric; Westinghouse; Alcoa $1,230,000

Services Provided

Major Areas of Expertise

- Hazardous waste solutions
- Treatment
- Recycling
- Reduction, bio-degradation

Current Activity Mix

• Basic Research	50%
• Applied Research	50%
• Prototype Development	
• Market Assessment	

Major Projects in FY89

1. Extraction of Organic Pollution Using Enhanced Surfactant Flushing
2. Effect of PCB Concentrations in the Hudson River
3. Metal Ion Separation from Hazardous Waste Streams by Impregnated Ceramic Membranes

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	1
Annual Report:	September

Networking Activities

Current Affiliations

- New Jersey Institute of Technology
- University of California, Los Angeles
- Gulf Coast Hazardous Substance Research Center, Beaumont, Texas

History

Date Founded: 1987
Founders: New York State Legislature
Reasons for Founding: State law mandated the improvement of state's hazardous waste system

New York, State University of (Stony Brook)

Marine Sciences Research Center
Stony Brook, NY 11794

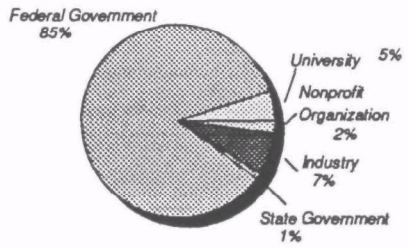
The Marine Sciences Research Center at SUNY Stonybrook centers its attention on marine biology and various facets of oceanography. The central thrust of the center's work investigates man's impact on the ocean environment as opposed to changes which have occurred as a result of natural processes.

Director: J.R. Schubel
Phone: (516)632-8701

Size and Scope

Number of Personnel:	190	FTEs:	125
Technical:	182	Administrative:	8
Background: PhDs:	45		

Sources of Funding for FY89



Federal Government: EPA; NOAA; DOD; NSF; ONR; U.S. Geological Survey $4,410,000
State Government: Department of Environmental Conservation $1,575,000
Industry $189,000
Nonprofit Organization: Olin Foundation; Hudson River Foundation $126,000

Services Provided

Major Areas of Expertise

- Coastal oceanographic research
- Coastal geological, chemical, biological and physical oceanography

Current Activity Mix

- Basic Research 70%
- Applied Research 30%
  Prototype Development

Major Projects in FY89

1. Long Island Sound Study
2. Phytoplankton Growth and Nitrogen Fixation
3. Benthic Community Structure
4. Motion and Mixing of Estuarine Waters
5. Multidisciplinary Amazon Shelf Sediment Study

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	6
Annual Report:	January
Courses Offered in 1989:	40

Networking Activities

Current Affiliations

- Parent to: Living Marine Resources Institute
- Waste Management Institute
- Coastal Ocean Strategies Institute

International Affiliations

- East China Normal University, Shanghai
- Netherlands Institute for Sea Research, Texel, The Netherlands;
- University of Las Palmas, Canary Islands

History

Date Founded: 1968

Founders: State University of New York at Stony Brook

Reasons for Founding: To study man's impact on the ocean

North Carolina State University

EPA Research Center for Waste Minimization and Management
Department of Chemical Engineering
Raleigh, NC 27695 7001

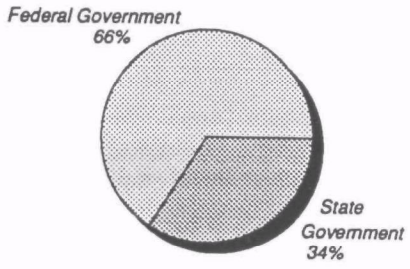
The EPA Research Center for Waste Minimization and Management is a consortium of North Carolina State University and the University of North Carolina at Chapel Hill. A primary research objective at the center is to improve manufacturing processes through reductions in chemical waste production and discharges.

Director: Michael Overcash
Phone: (919)787-2325

Size and Scope

Number of Personnel:	23	FTEs:	
Technical:	20	Administrative:	3
Background: PhDs:	20		

Sources of Funding for FY89



Federal Government: EPA	$990,000
State Government	$510,000

Services Provided

Major Areas of Expertise

- Waste minimization and management

Current Activity Mix

- Applied Research 100%

Major Projects in FY89

1. Study and Develop a Dry Process of Surface Cleaning that Avoids the Use of Chlorinated Solvents
2. Study of Dioxin and Chlorinated Organics in the Pulp and Paper Industry
3. Basic Study of Volatile Chemical Transport Mechanisms from Residues and Wastes, through Clay and Synthetic Liners to Beyond the Containment Facility
4. Industrial Demonstration of Hazardous Waste Minimization
5. Study of Public Product Preference to Identify Reductions in Hazardous Substances That Can Be Related to Consumer Patterns

Technology Transfer Mechanisms/ Outreach Programs

Annual Report:	March

Networking Activities

Current Affiliations

- This center is a consortium of North Carolina State University
- University of North Carolina, Chapel Hill
- Texas A&M University
- Affiliated with EPA's other regional centers

History

Date Founded: 1989
Founders: EPA; Michael Overcash
Reasons for Founding: To develop practical means for industry to eliminate the use and generation of hazardous substances, to treat waste and to provide containment

North Carolina, University of

North Carolina Water Resources Research Institute
Box 7912
Raleigh, NC 27695 7912

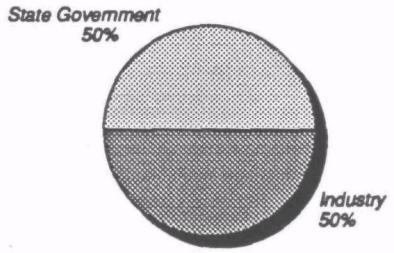
The North Carolina Water Resources Research Institute at the University of North Carolina was established to formulate a research program responsive to state water resources problems. Research priorities include: water supply, waste management, surface water quality, and groundwater.

Director: David H. Moreau
Phone: (919)737-2815

Size and Scope

Number of Personnel:	60	FTEs:	50
Technical:	56	Administrative:	4
Background: PhDs:	40	MSs:	16

Sources of Funding for FY89



Federal Government	$500,000
State Government	$500,000

Services Provided

Major Areas of Expertise

- Hydrology
- Water quality
- Surface and ground water studies for all of North Carolina

Current Activity Mix

• Basic Research	10%
• Applied Research	90%
• Prototype Development	

Major Projects in FY89

1. Groundwater Management
2. Drought Management
3. Drinking Water and Surface Water Quality Studies
4. Coastal Water Management
5. Climate Change and Water Resources

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Annual Report:	September

Networking Activities

Current Affiliations

- North Carolina State University
- University of North Carolina at Chapel Hill
- East Carolina University
- Elizabeth City State University
- Wake Forest University
- University of North Carolina at Charlotte
- U.S. Geological Survey; National Association of Water Institute Directors (NAWID)

History

Date Founded: 1964
Founders: Federal government; State of North Carolina
Reasons for Founding: Water Resources Research Act of 1964

North Carolina, University of (Chapel Hill)

Center for Urban and Regional Studies
108 Battle Lane
Chapel Hill, NC 27514

University of North Carolina at Chapel Hill's Center for Urban and Regional Studies produces nationally recognized research in hazards mitigation, coastal zone management, and growth management. The center draws

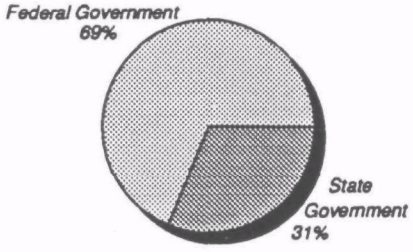
on faculty from many disciplines including, anthropology, biostatistics, business administration, city and regional planning, economics, epidemiology, history, law, marine sciences, political science, psychology, social work and sociology.

Director: Jonathan B. Howes
Phone: (919)962-3074

Size and Scope

Number of Personnel:	10	FTEs:	10
Technical:	10	Administrative:	0

Sources of Funding for FY89



Federal Government	$550,000
State Government	$250,000

Services Provided

Major Areas of Expertise

- Growth management
- Coastal area development and management
- Natural hazard planning and mitigation
- Planning and politcs
- Regional development policy

Current Activity Mix

- Applied Research 100%
- Unique Specialties: Public policy for growth management for local government

Major Projects in FY89

1. Coping With Losses to Infrastructure from Natural Hazards
2. An Evaluation of the National Coastal Zone Management Program
3. Evaluation of North Carolina Erosion and Sedimentation Control Program
4. Fort Bragg/Pope A.F.B. Impact and Assessment and Land Use Compatability Study

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Annual Report:	Spring

Networking Activities

Current Affiliations

- Urban Affairs Association
- Natural Hazards Research Group, Boulder, Colorado

International Affiliations

- International New Towns Association, Nassau, Bahamas
- Dillenburgstraat 44, 2596 AE The Hague, The Netherlands

History

Date Founded: 1957
Founders: F. Stuart Chapin, Jr.
Reasons for Founding: To study urbanization of Piedmont, North Carolina, under a Ford Foundation grant

North Dakota, University of

Energy and Environmental Research Center
Box 8213
University Station
Grand Forks, ND 58202

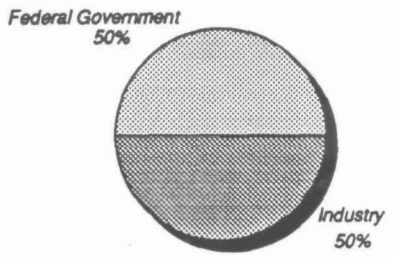
University of North Dakota's Energy and Environmental Research Center embraces an integrated systems approach to energy and environmental reserch. Center research begins with a fundamental evaluation of Earth resources, followed by research and development on innovative technologies to efficiently utilize those resources, and culminating in the utilization or safe disposal of the wastes generated in natural resources consumption.

Director: Gerald Groenewold
Phone: (701)777-5100

Size and Scope

Number of Personnel:	220	FTEs:	190
Technical:	150	Administrative:	40
Background: PhDs:	25		

Sources of Funding for FY89



Federal Government: DOE; EPA; U.S. Bureau of Mines; U.S. Geological Survey; NSF; USDA . $5,750,000
Industry: Gas Research Institute; Electric Research Institute $5,750,000

Services Provided

Major Areas of Expertise

- Coal oil
- Gas and geothermal energy
- Emission control technology
- Ground water research
- Waste management and waste site cleanup

Current Activity Mix

- Basic Research 15%
- Applied Research 85%
  - Prototype Development
  - Market Assessment
- Unique Specialties: Air emissions work; coal water fuels; leading low-rank coal center in world

Major Projects in FY89

1. Manage Ground Water Research Program for U.S. Gas Research Institute
2. Mild Gasification Research
3. Technology to Remediate Flue Gas Emissions
4. Consortium to Study Coal Water Fuels in the Philippines
5. Western U.S. Lead for National Land & Mine Reclamation Program

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 4
Annual Report: February
Patent Licenses Issued in the Last 3 Years: 9

Networking Activities

Current Affiliations

- Batelle Memorial Institute
- Bechtel Power Corporation

International Affiliations

- Hosts international conference on Synthetic Fuels Industry

History

Date Founded: 1951
Founders: Federal Government
Reasons for Founding: To bring integrated systems approach to energy and mineral research

Nova University

Oceanographic Center
8000 North Ocean Drive
Dania, FL 33004

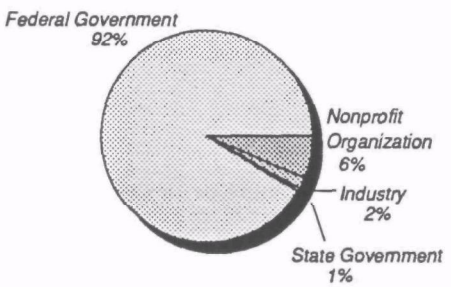
Nova University's Oceanographic Center pursues studies and investigations in experimental and theoretical oceanography. Research includes modeling of large-scale ocean circulation, coastal dynamics, ocean-atmosphere coupling, surface gravity waves, biological oceanography, chemical oceanography, coral reef assessment, pleistocene and holocene sea level changes, physiology of marine phytoplankton, marine zooplankton, calcification of invertebrates, cell ultrastructure, fouling effects, marine fisheries and nutrient dynamics.

Director: Julian P. McCreary, Jr.
Phone: (305)920-1909

Size and Scope

Number of Personnel:	20	FTEs:	20
Technical:	17	Administrative:	3
Background: PhDs:	12	MSs:	2

Sources of Funding for FY89



Federal Government: ONR; NOAA; U.S. Geological Survey; U.S. Air Force $929,151
State Government: Florida Sea Grant $5,078
Industry: Macintosh Marine $18,278
Nonprofit Organization: Whitehall Foundation . $62,958

Services Provided

Major Areas of Expertise
- Oceanography
- Coral reef assessment

Current Activity Mix

• Basic Research	97%
• Applied Research	3%
Prototype Development	

Major Projects in FY89

1. Modeling Tropical Western Boundry Circulation
2. Karotonoid Pigments in Microzooplankton: Characterization and Relation to Biomass
3. Compositions in Sclearactinian Coral Skeletons
4. Two-Dimensional Evolution of the Surface Gravity Wave Field
5. Non-Interactive Least-Square Adjustments of Non-Linear Parametric Models in Geodesy

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	20

Networking Activities

Current Affiliations
- Operates: Institute for Marine and Coastal Studies

International Affiliations
- Bermuda Biological Station, St. Georges, Bermuda

History

Date Founded: 1966
Founders: Nova University
Reasons for Founding: Oceanographic research

Ohio State University

Center for Lake Erie Area Research (CLEAR)
1541 Research Center
1314 Kinnear Road
Columbus, OH 43212

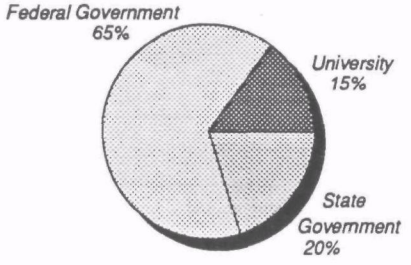
Ohio State University's Center for Lake Erie Area Research is the home of Ohio's Sea Grant College Program. The goal of the program is to increase utilization, development and wise management of Lake Erie's resources through research, education and advisory service. Extension district specialists work locally to solve problems and challenges that communities, businesses and individuals encounter.

Director: Jeffrey M. Reutter
Phone: (614)292-8949

Size and Scope

Number of Personnel:	45	FTEs:	30
Technical:	44	Administrative:	1
Background: PhDs:	30	MSs:	15

Sources of Funding for FY89



University: Ohio State University	$150,000
Federal Government: NOAA-Sea Grant Program	$650,000
State Government: Ohio Department of Natural Resources	$200,000

Services Provided

Major Areas of Expertise
- Water quality
- Fisheries habitat enhancement
- Toxic substances

Current Activity Mix

• Basic Research	40%
• Applied Research	60%
• Unique Specialties: Underwater welding	

Major Projects in FY89

1. Artificial Reef Development
2. Underwater Welding
3. Non-Destructive Techniques to Evaluate Underwater Welds
4. Bioengineering to Control Algal Blooms

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	100
Annual Report:	Winter
Courses Offered in 1989:	14

Networking Activities

Current Affiliations
- Ohio Sea Grant College Program
- Franz Theodore Stone Laboratory
- University of Toledo
- University of Cincinnati
- Case Western Reserve College
- Kent State University

International Affiliations
- International Joint Commission on Canada and U.S.

History

Date Founded: 1971
Founders: Ohio State University
Reasons for Founding: To clean up Lake Erie

Ohio State University

Water Resources Center
1791 Neil Avenue
Columbus, OH 43210

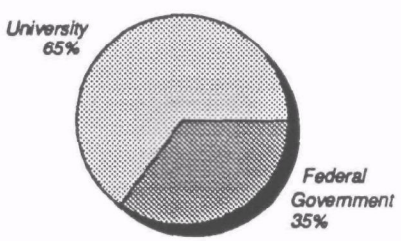
Ohio State University's Water Resources Center is an integral part of the university's Engineering Experiment Station. The center's research focuses on water quality, wastewater treatment, hydrology and the economics of water resources. The center trains scientists and technicians in all aspects of water management.

Director: Robert C. Stiefel
Phone: (614)292-2334

Size and Scope

Number of Personnel:	2	FTEs:	1
Technical:	1	Administrative:	1
Background: PhDs:	1		

Sources of Funding for FY89



University: Ohio State University $650,000
Federal Government: EPA $350,000

Services Provided

Major Areas of Expertise
- Water resources

Current Activity Mix

• Basic Research	50%
• Applied Research	50%

Major Projects in FY89

1. Agricultural Containment

Technology Transfer Mechanisms/ Outreach Programs

Annual Report: July

History

Date Founded: 1964
Founders: Federal and State Legislation
Reasons for Founding: Water Resource Law

Oklahoma State University

University Center for Water Research
003 Life Sciences East
Stillwater, OK 74078

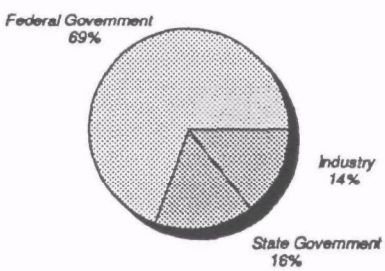
Oklahoma State University's University Center for Water Research provides research expertise in agricultural use efficiency, bioremediation, conservation, hydrology, resources education, resources management, and water quality. The center is administratively responsible for programs associated with the Oklahoma Water Resources Research Institute, the Water Research Center and the National Center for Ground Water Research.

Director: Norman Durham
Phone: (405)744-9995

Size and Scope

Number of Personnel:	48	FTEs:	26
Technical:	42	Administrative:	6
Background: PhDs:	43	BSs:	5

Sources of Funding for FY89



Federal Government: EPA; DOD; NIH; NSF; DOE; HHS; U.S. Geological Survey; Fish and Wildlife Service; U.S. Air Force $2,400,000
State Government $560,000
Industry: Phillips Petroleum; Continental Oil; Sun Company $500,000

Services Provided

Major Areas of Expertise

- Toxicology
- Environmental engineering
- Waste materials
- Water reclamation

Current Activity Mix

- Basic Research 60%
- Applied Research 40%
- Products or Processes Commercialized: Water quality analysis

Major Projects in FY89

1. Environmental Toxicology Research
2. Fate and Transport of Toxicants in the Sub-Surface
3. Water Reclamation
4. Environmental Policy Research

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	2
Courses Offered in 1989:	3

Networking Activities

Current Affiliations

- National Center for Ground Water Research
- Oklahoma WaterResources Board
- U.S. Geological Survey

History

Date Founded: 1965
Founders: Oklahoma State University
Reasons for Founding: To research quantity and quality of water

Oklahoma, University of

Oklahoma Biological Survey
Sutton Hall
Room 303, 625 Elm Street
Norman, OK 73019

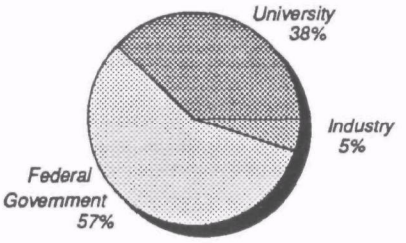
The University of Oklahoma's Biological Survey is responsible for quantifying the state's plant and animal communities. The survey also operates the Bebb Herbarium and the Oklahoma Fishery Research Laboratory.

Director: Gary D. Schnell
Phone: (405)325-4034

Size and Scope

Number of Personnel:	25	FTEs:	25
Technical:	18	Administrative:	7
Background: PhDs:	6	MSs:	15

Sources of Funding for FY89



University: University of Oklahoma . . . $570,000
Federal Government: U.S. Army; U.S. Fish and Wildlife Service; USDA $855,000
Industry: Oklahoma Gas and Electric $75,000

Services Provided

Major Areas of Expertise

- Assessment of plant and animal communities
- Computer applications
- Statistics

Current Activity Mix

- Basic Research 35%
- Applied Research 65%

Major Projects in FY89

1. Flora Study of Fort Sill
2. Flora Study of Fort Leonardwood
3. Flora Study of Fort Chaffee
4. Design of Wildlife Studies for Integration with Land Condition Trend Analysis (LCTA)

Technology Transfer Mechanisms/ Outreach Programs

Annual Report:	January

Networking Activities

Current Affiliations

- Oklahoma Natural Heritage Inventory
- The Nature Conservancy
- American Ornithologists Union

History

Date Founded: 1927
Founders: University of Oklahoma
Reasons for Founding: To quantify state's biological resources

Oregon State University

Environmental Health Sciences Center
317 Weinger Hall
Corvallis, OR 97331

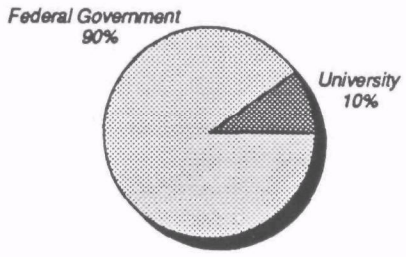
Oregon State University's Environmental Health Sciences Center facilitates interdisciplinary research in toxicology, biochemistry, molecular biology, chemistry, immunotoxicology, food toxicology, agricultural chemistry, pathology and statistics. A main research thrust involves molecular and cellular mechanisms of environmental injury, emphasizing the use of immunological and host defense mechanisms against environmentally induced injuries and diseases.

Director: Donald J. Reed
Phone: (503)754-3608

Size and Scope

Number of Personnel:	22	FTEs:	22
Technical:	18	Administrative:	4
Background: PhDs:	11	MSs:	5

Sources of Funding for FY89



University: Oregon State University . . . $150,000
Federal Government: National Institute of Environmental Health Sciences . . . $1,350,000

Services Provided

Major Areas of Expertise

- Chemistry
- Biochemistry
- Toxicology
- Immunology
- Cell biology

Current Activity Mix

- Basic Research 95%
- Applied Research 5%
  Prototype Development
- Unique Specialties: Mass Spectrometry; Serum-free Cell Culture; Biochemical Toxicology

Major Projects in FY89

1. Toxicology of Environmental Halocarbons
2. Chemical Toxicity and Gentathione Regulation
3. Trout Xenobiotic Metabolizing Enzymes and Carcinogenesis
4. Alterations in Cell Surface Marker Expression by Dioxins
5. Mass Spectrometry of Involatile Biomolecules

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	2
Annual Report:	January
Patents Issued in the Last 3 Years:	1

History

Date Founded: 1967
Founders: Oregon State University
Reasons for Founding: Concern about the environment and use of pesticides

Pennsylvania State University

Environmental Resources Research Institute
Land and Water Resource Building
University Park, PA 16802

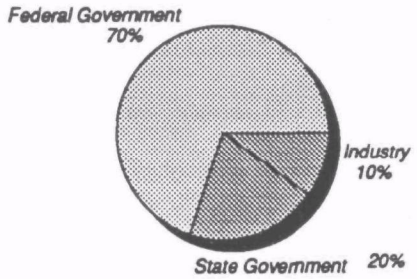
Pennsylvania State University's Environmental Resources Research Institute supports interdisciplinary research involving air, land and water resources. The institute operates laboratories for water quality testing, soil and environmental chemistry, remote sensing and forest hydrology. The institute also monitors acid rain and performs watershed studies at numerous field research sites statewide.

Director: Archie J. McDonnell
Phone: (814)863-0291

Size and Scope

Number of Personnel:	145	FTEs:	80
Technical:	128	Administrative:	17
Background: PhDs:	20	MSs:	50

Sources of Funding for FY89



Federal Government: DOE; EPA; DOI; USDA; Army Corps of Engineers; USAF; National Institute on Aging $3,360,000
State Government: Department of Natural Resources; Ben Franklin Partnership $960,000
Industry: Air Products; Martin Marietta; Mobil Oil; NLO; Allegheny Power; Nuclear; Pennsylvania Power & Light; Duquesne Light; Philadelphia Electric $480,000

Services Provided

Major Areas of Expertise

- Air, land and water resources
- Land recycling of wastes
- Environmental toxicology
- Hazardous waste management
- Acid rain
- Air pollution
- Water quality management
- Technical assessment and information transfer

Current Activity Mix

• Basic Research	20%
• Applied Research	80%
Prototype Development	

Major Projects in FY89

1. Integrated Terrain Units as a Technique to Computerize Soil Surveys
2. Wildlife Management Plan for the Letterkenney Army Depot
3. Predicting Plant Responses to Multiple Stress
4. Removal of Cryptosporidium Using Filtration
5. Characterization of Activated Sludge Flocs

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	3
Annual Report:	Biennial - January

Networking Activities

Current Affiliations

- DOE Water Center Program
- Land Grant College Association
- American Society of Civil Engineers
- National Mine Land Reclamation Center

History

Date Founded: 1964
Founders: Pennsylvania State University
Reasons for Founding: As a result of the Water Resources Research Act of 1964

Pittsburgh, University of

Center for Environmental Epidemiology
Graduate School of Public Health
Pittsburgh, PA 15261

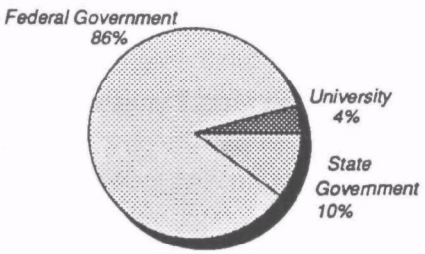
The University of Pittsburgh's Center for Environmental Epidemiology is the only EPA Center of Excellence that does strictly public health related work. Research is focused on environmental epidemiology, risk assessment, exposure assessment, and biological monitoring.

Director: Bruce Case
Phone: (412)624-3012

Size and Scope

Number of Personnel:	10	FTEs:	3
Technical:	7	Administrative:	3
Background: PhDs:	10		

Sources of Funding for FY89



University: University of Pittsburgh $30,000
Federal Government: EPA $600,000
State Government $70,000

Services Provided

Major Areas of Expertise
- Environmental epidemiology
- Risk assessment
- Exposure assessment
- Biological monitoring

Current Activity Mix
- Basic Research 100%
- Unique Specialties: The only public health related EPA Center of Excellence

Major Projects in FY89

1. Fibrous Particulates in the Lungs of American Children
2. Volatile Organic Compounds from Indoor Water Services
3. Legionella Aboeba Research
4. Carcinogenic Risk Assessment, Enhancement of Methodologies and Applications to Cohort Data Sets

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 2
Annual Report: December

Networking Activities

Current Affiliations
- Carnegie Mellon University

International Affiliations
- International Society for Environmental Epidemiology
- World Health Organization

History

Date Founded: 1980
Founders: University of Pittsburgh; EPA
Reasons for Founding: To create EPA Center of Excellence for environmental epidemiology

Pittsburgh, University of

Center for Hazardous Materials Research
320 William Pitt Way
Pittsburgh, PA 15238

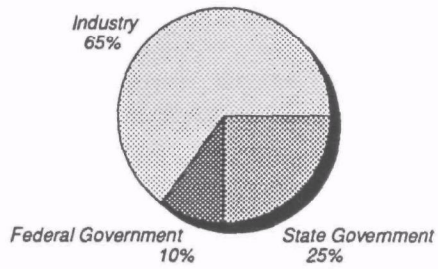
University of Pittsburgh's Center for Hazardous Materials Research was formed in response to growing regional, national and international problems associated with the use and disposal of hazardous materials and solid wastes. The center is strategically located at the heart of the northeastern industrial belt, and Pittsburgh represents a microcosm of the waste management and cleanup problems faced in the county.

Director: Edgar Berkey, President
Phone: (412)826-5320

Size and Scope

Number of Personnel:	35	FTEs:	32
Technical:	28	Administrative:	7
Background: PhDs:	2	MSs:	17

Sources of Funding for FY90



Federal Government: EPA; DOT $320,000
State Government $800,000
Industry: Ashland Oil; Westinghouse; Alcoa $2,080,000

Services Provided

Major Areas of Expertise
- Hazardous waste reduction
- Compliance reviews
- Independent third party environmental evaluations
- Risk assessment
- Chemical destruction technologies

Current Activity Mix
- Applied Research 100%
- Unique Specialties: Speakers bureau for the business community; extensive training program using hands-on simulations of problems that occur at spill sites

Major Projects in FY89

1. Analysis of the Effects of Inland Oil Spills
2. Pilot Plant Testing of a Chemical Destruction Technique for a Proprietary Hazardous Organic Chemical
3. Investigation of the Chemical Fate of two 4-D Herbicides
4. Environmental Assessment of Properties Slated for Industrial Redevelopment
5. Development of Education Materials in Pollution Prevention

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 12
Annual Report: Spring
Courses Offered in 1989: 18
Other: Advertising in trade magazines; publishes Manuals and Fact Sheets; Hotline (800)334-CHMR available to anyone

Networking Activities

Current Affiliations

- National Roundtable of State Waste Products Programs

International Affiliations

- Netherlands Organization for Applied Science Research (TNO);
- Institute for Industrial Waste and Waste Management, Saarlands, West Germany
- U.S.S.R. State Committee for Environmental Protection

History

Date Founded: 1985
Founders: Samuel Schulhof, Edgar Berkey
Reasons for Founding: To utilize an industrial campus given to the University of Pittsburgh Trust by Gulf Oil

Pittsburgh, University of

National Environmental Technology Applications Corporation
615 William Pitt Way
Pittsburgh, PA 15238

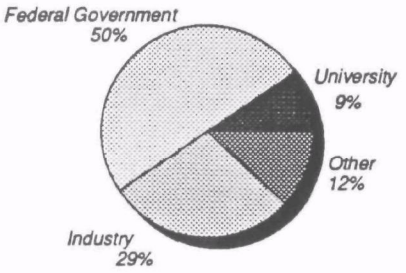
The University of Pittsburgh's National Environmental Technology Applications Corporation (NETAC) is dedicated to moving new environmental cleanup technologies into the marketplace. The company specializes in technology assessments, market analysis, commercialization assistance, and testing and evaluation of promising new products designed by industry and government.

Director: Samuel A. Schulhof
Phone: (412)648-7850

Size and Scope

Number of Personnel:	20	FTEs:	20
Technical:	16	Administrative:	4
Background: PhDs:	16		

Sources of Funding for FY89



University: University of Pittsburgh	$190,000
Federal Government: EPA	$1,000,000
Industry	$570,000
Other	$240,000

Services Provided

Major Areas of Expertise

- Technology transfer, specializing in identifying, developing and marketing technologies which solve environmental problems
- Seeks to help companies commercialize environmental technologies

Current Activity Mix

- Applied Research 100%
  Prototype Development
- Unique Specialties: Market Assessment

Major Projects in FY89

1. Helping Suprex Inc., to Commercialize SFG/50 Supercritical Fluid Extraction System
2. Helping Quadrel Services Inc., to Commercialize Emflex
3. A Process for Mapping Subsurface Volatile and Semi-Volatile Compounds
4. Hosted a Bio-Remediation Conference in October 1989

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1

Networking Activities

Current Affiliations

- Center for Hazardous Materials Research

International Affiliations

- Netherlands Organization for Applied Research, (TNO)
- Saarlands Der Minister Fur Kultus, Bilding Und Wissenschaft, Hohenzollenstrabe 60, Post Fach 1010, 6600 Faarbruken, Saarlands, West Germany

History

Date Founded: 1989
Founders: University of Pittsburgh; EPA
Reasons for Founding: Federal Technology Transfer Act 1986

Princeton University

Center for Energy and Environmental Studies
Engineering Quadrangle
Princeton, NJ 8544

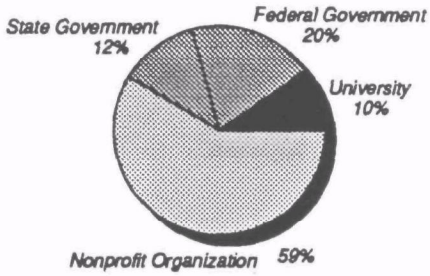
Princeton University's Center for Energy and Environmental Studies presupposes that imaginative options which reduce the risk of calamity will be generated by individuals working within an institutional framework that rewards creativity and independence. Researchers combine a respect for physical modeling and measurement and a skepticism of established wisdom with a value system that views the world ecologically.

Director: Robert H. Socolow
Phone: (609)258-5445

Size and Scope

Number of Personnel:	33	FTEs:	33
Technical:	22	Administrative:	11
Background: PhDs:	18	MSs:	4

Sources of Funding for FY89



University: Princeton University $200,000
Federal Government $400,000
State Government $250,000
Nonprofit Organization: Rockefeller Foundation; Carnegie Foundation; MacArthur Foundation; and others $1,200,000

Services Provided

Major Areas of Expertise

- Nuclear energy
- Arms control verification
- Alternative energy services (biomath, photovoltaics)
- Radon
- Energy conservation in buildings

Current Activity Mix

- Applied Research 100%
  Market Assessment
- Products or Processes Commercialized: PRISM, a software package that checks cost-cutting techniques
- Unique Specialties: Radon research

Major Projects in FY89

1. The program on Nuclear Policy Alternatives
2. Energy Technology Assessment
3. Mitigation Techniques for Radon in Buildings
4. New Jersey Conservation Laboratory

Technology Transfer Mechanisms/ Outreach Programs

Annual Report: October

History

Date Founded: 1971
Founders: Mechanical and Aerospace Engineering Departments of the University
Reasons for Founding: To respond to heightened national interest in environmental quality

Rhode Island, University of

Coastal Resources Center
Narragansett Bay Campus
Narragansett, RI 02882

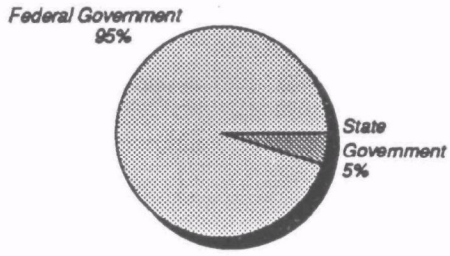
The University of Rhode Island's Coastal Resources Center is dedicated to applying new concepts, information and techniques, to better manage coastal regions. Through its overseas Coastal Management Program, the center assists developing countries in researching and managing coastal ecosystems.

Director: Stephen Olsen
Phone: (401)792-6224

Size and Scope

Number of Personnel:	20	FTEs:	20
Technical:	12	Administrative:	8
Background: PhDs:	1	MSs:	11

Sources of Funding for FY89



Federal Government: USAID; NOAA; EPA $1,710,000
State Government $90,000

Services Provided

Major Areas of Expertise

- Technical assistance on coastal resource management
- Training
- Public education
- Applied research

Current Activity Mix

- Applied Research 100%

Major Projects in FY89

1. U.S. Agency for International Development (AID), Coastal Resources Management Project
2. Comparative Estuaries Program
3. Pond Watchers Program
4. Research, Management, Planning and Implementation of Projects in Equador, Thailand and Sri Lanka

Technology Transfer Mechanisms/ Outreach Programs

Annual Report: December
Courses Offered in 1989: 4

Networking Activities

Current Affiliations

- National Sea Grant Program
- National Estuaries Program (a national network of trained volunteers)

International Affiliations

- Sri Lanka National Coastal Zone Management Plan
- Ecuador Coastal Resources Management Program
- U.S. AID for International Development Missions in Sri Lanka and Thailand
- Coastal Damage Studies in the Republic of the Maldives

History

Date Founded: 1971
Founders: John Krauss, Dean, Graduate School of Oceanography
Reasons for Founding: To allow local governments to draw on university resources for coastal management

Rhode Island, University of

Rhode Island Agricultural Experiment Station (RIAES)
Woodward Hall
Kingston, RI 02881

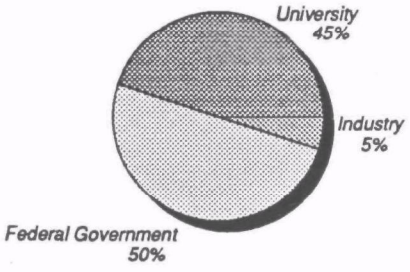
University of Rhode Island's Agricultural Experiment Station is a multidisciplinary research unit that focuses primarily on marine resources economics, agriculture and fish pathology. Two important missions of the Experiment Station are to increase assurance of the quality and safety of food for the consumer, and to analyze cleanup and control efforts at oil spills and other hazardous waste sites.

Director: Robert H. Miller
Phone: (401)792-2474

Size and Scope

Number of Personnel:	62	FTEs:	40
Technical:	30	Administrative:	10
Background: PhDs:	46	MSs:	6

Sources of Funding for FY89



University: University of Rhode Island . . $450,000
Federal Government: USDA; NIH; NSF . . $500,000
Industry $50,000

Services Provided

Major Areas of Expertise

- Marine resource economics
- Agriculture
- Fish pathology

Current Activity Mix
- Basic Research 15%
- Applied Research 85%
  - Prototype Development
  - Market Assessment
- Products or Processes Commercialized: Turf grass licensing
- Unique Specialties: Coastal-related agriculture

Major Projects in FY89

1. New Approaches to the Acetone-Butonal Fermentation
2. The Potential for Wine Manufacture from Rhode Island Grapes and Fruit Growth
3. Improving the Assurance of Quality and Safety of Consumer Food
4. An economic Analysis of Efforts for Cleanup and Control of Oil Spills and Hazardous Substances
5. An economic Analysis of Efforts for Cleanup and Control of Oil Spills and Hazardous Substances

Technology Transfer Mechanisms/ Outreach Programs

Annual Report:	September
Patents Issued in the Last 3 Years:	2
Patent Licenses Issued in the Last 3 Years:	1
Other: Rhode Island Cooperative Extension Service	

History

Date Founded: 1888
Founders: Rhode Island State Agriculture School
Reasons for Founding: To meet provisions of the Hatch Act 1866

Rhode Island, University of

Sea Grant College Program
Narragansett, RI 02882

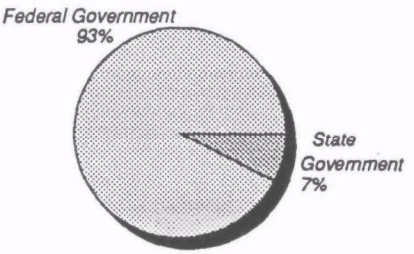
The University of Rhode Island's Sea Grant College Program focuses its research efforts on development of marine resources, their conservation and management. Through its Office of Marine Programs, the Sea Grant College Program furnishes information and findings to the public.

Director: Scott Nixon
Phone: (401)792-6800

Size and Scope

Number of Personnel:	24	FTEs:	22
Technical:	20	Administrative:	2
Background: PhDs:	21	MSs:	1

Sources of Funding for FY89



Federal Government	$1,483,000
State Government	$120,000

Services Provided

Major Areas of Expertise
- Marine advisory service
- Program development
- Education and training
- Coastal management

Current Activity Mix
- Basic Research 50%
- Applied Research 50%

Major Projects in FY89

1. Continuing Long-Term Water Quality Study of Estuaries
2. Influence of Temperature on Flounder Larvae Development
3. Atlantic Salmon Research (Molecular; Biological; Hormonal)
4. Comparative Study of Estuary Management, from Public Policy and Sociology Perspectives
5. Salt Ponds Project

Technology Transfer Mechanisms/ Outreach Programs

Annual Report:	January
Courses Offered in 1989:	6

Networking Activities

Current Affiliations
- Marine Advisory System
- New England Sea Grant Program

History

Date Founded: 1968
Founders: National Sea Grant College Program
Reasons for Founding: To form a partnership between government, universities and industry

Rhode Island, University of, Graduate School of Oceanography

Marine Ecosystems Research Laboratory
Narragansett, RI 02882 1197

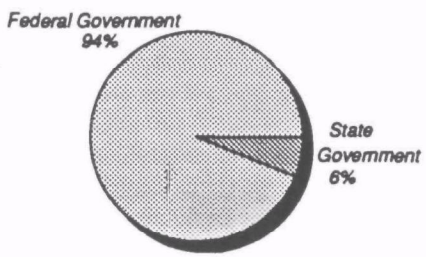
The Marine Ecosystems Research Laboratory (MERL) at the University of Rhode Island is staffed by experts in experimental marine biogeochemistry and ecology. The focus is mainly on work in mesocosm enclosures, along with some field work in Narragansett Bay.

Director: Michael Pilson
Phone: (401)792-6104

Size and Scope

Number of Personnel:	11	FTEs:	7
Technical:	6	Administrative:	1
Background: PhDs:	6	MSs:	1

Sources of Funding for FY89



Federal Government: EPA; NSF; NOAA . $752,000
State Government $48,000

Services Provided

Major Areas of Expertise

- Coastal marine ecosystem research
- Radiotracing research

Current Activity Mix

- Basic Research 50%
- Applied Research 50%
  Prototype Development
- Unique Specialties: Radiotracing and organic tracing in coastal areas; extensive long-term sea water testing

Major Projects in FY89

1. Wastewater Discharges to Marine Environment
2. Fate of Tributal Tin
3. Impact of High-Pressure CO_2 on Isotical Composites
4. Fates of Organic and Inorganic Compounds in Coastal Environment
5. Effects of Number 2 Fuel Oil on Marine Environment

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1

History

Date Founded: 1976
Founders: University of Rhode Island Faculty
Reasons for Founding: To expand marine ecosystem research and to assist the local EPA branch office

Rice University, University of Oklahoma, Oklahoma State University

National Center for Ground Water Research
P.O. Box 1892
Houston, TX 77251

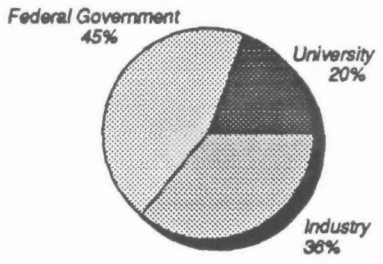
The National Center for Ground Water Research is a consortium of Rice University, The University of Oklahoma, and Oklahoma State University. The center's objective is to improve the understanding of the subsurface environment and its interaction with pollutants. The center has particular experience with in situ bioremediation.

Director: C.H. Ward
Phone: (713)527-4086

Size and Scope

Number of Personnel:	25	FTEs:	25
Technical:	25	Administrative:	0
Background: PhDs:	12	MSs:	6

Sources of Funding for FY89



University: Consortium: Rice University; Oklahoma State University; University of Oklahoma . . $256,000
Federal Government: EPA; NASA; Army Corps of Engineers $585,000
Industry: Shell; Dupont; Union Carbide; Sun Oil $470,000

Services Provided

Major Areas of Expertise

- Improvement of subsurface environment and its interaction with pollutants
- Transport and fate of groundwater contaminants
- Study of subsurface and pollutant characteristics
- Development of methods to access and protect groundwater quality

Current Activity Mix

- Basic Research
- Applied Research
  Prototype Development
- Unique Specialties: In situ bioremediation

Major Projects in FY89

1. Use of Indigenous Subsurface Microorganisms to Destroy Synthetic and Petroleum Derived Compounds Present in Ground Water
2. Study to Probe the Biodegradability of 24 Different Nitrogen Substituted and Sulfonated Benzene Aquifer Contaminants
3. The Fate of Halogenated Organic Chemicals in Anoxic Aquifers
4. Assessment of Spatial Variability in Biodegradation Rates as Evidenced by the Production of Methane
5. Cooperative Field Demonstration (with EPA, R.S. Kerr Environmental Research Laboratory) Conducted at U.S. Coast Guard Station in Traverse City, Michigan, Quantitative Demonstration of Raymond Process

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Courses Offered in 1989:	2

Other: Update and improvement in soil transport and fate data base; 14 articles in referenced journals; 3 books and bound proceedings; 17 chapters in other books; 24 proj. rep.

Networking Activities

Current Affiliations

- Auburn University
- Utah State University
- University of Texas
- University of California, Riverside
- EPA

International Affiliations

- International conference held at Rice University on "Biological Processes for Subsurface Restoration"
- University of Kyoto, Japan

History

Date Founded: 1979
Founders: EPA
Reasons for Founding: To create an EPA Center of Excellence for groundwater research

Rutgers University

Center for Coastal and Environmental Studies
104 Doolittle Building
Busch Campus
New Brunswick, NJ 08903

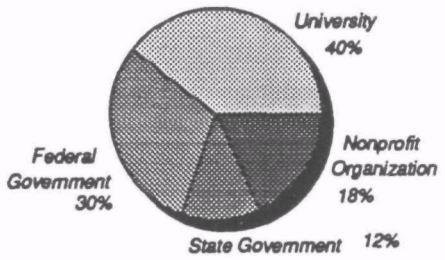
Rutgers University's Center for Coastal and Environmental Studies has been involved in many projects ranging from onshore site planning for offshore petroleum to studies of coastal processes and research on the ecology of the pine barrens. The knowledge gained in the center's programs is disseminated through educational and training curricula in the classroom, in the laboratories and in the field.

Director: Norbert P. Psuty
Phone: (201)932-3738

Size and Scope

Number of Personnel:	30	FTEs:	30
Technical:	24	Administrative:	6
Background: PhDs:	20	MSs:	6
BSs:	4		

Sources of Funding for FY89



University: Rutgers University $643,450
Federal Government: National Park Service $491,890
State Government $196,750
Nonprofit Organization: Conservation Foundation;
New Jersey Fund; Victoria Fund . . . $295,130

Services Provided

Major Areas of Expertise

- Estuarine ecological studies
- Coastal erosion
- Sedimentation
- Marine fisheries
- Pinelands ecology

Current Activity Mix

- Basic Research 67%
- Applied Research 33%
  Prototype Development
- Unique Specialties: Contracts with National Park Service on science in coastal parks and Atlantic Ocean

Major Projects in FY89

1. Resource Documents on Scientific Inquiry in Atlantic Coastal National Parks
2. Acid Precipitation in Stream Water Chemistry in the Pinelands
3. A Study of the Endangered Shortnose Sturgeon in the Delaware River
4. Fisheries, Aquaculture, and Running Seawater System at the Rutgers Marine Field Station
5. Habitat Ecology of Offshore American Lobster

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1
Annual Report: October

Networking Activities

Current Affiliations

- National Park Service
- University of Massachusetts
- Woods Hole
- State University of New York, Stony Brook
- University of Delaware

International Affiliations

- International Commission on the Coastal Environment of the International Geographic Union

History

Date Founded: 1971
Founders: Dr. Harold Haskin; Dr. Norbert Psuty
Reasons for Founding: To direct and coordinate research in the coastal zone of New Jersey

San Jose State University

Moss Landing Marine Laboratories
P.O. Box 450
Moss Landing, CA 95039

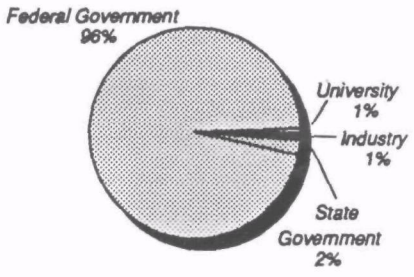
San Jose State University's Moss Landing Marine Laboratories is jointly operated by six campuses of the California State University system. The laboratories' location is a tremendous asset, with Monterey Submarine Canyon, Elkhorn Slough, sand dunes, rocky intertidal environments, and subtidal kelp forests all nearby. The associated flora and fauna in these habitats provide limitless opportunities for field-oriented studies and research.

Director: John H. Martin
Phone: (408)633-3304

Size and Scope

Number of Personnel:	34	FTEs:	9
Technical:	23	Administrative:	11
Background: PhDs:	15	MSs:	4

Sources of Funding for FY89



University: San Jose State University $29,600
Federal Government: NSF; NOAA; ONR . $4,715,730
State Government: Sea Grant Program; State Park and Recreation; State Fish and Game . . $110,884
Industry: Kinetic Labs; Harding Lawson Associates $55,000

Services Provided

Major Areas of Expertise

- All disciplines of marine sciences

Current Activity Mix

- Applied Research 100%

Major Projects in FY89

1. Global Ocean Flux - Greenhouse Effect
2. In Situ Measurements of Chemical and Biological Interactions in Deep Sea Hydrothermal Vent Communities
3. Sediment Dynamics In South Atlantic Sector of Southern Ocean
4. Lateral Transportation of Trace Elements in the North East Pacific Intermediate Waters
5. Use of Algal Pigments as Biological Tracers for Upper Ocean Mixing

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1
Courses Offered in 1989: 16

Networking Activities

Current Affiliations

- Consortium of Six California State University Campuses
- Central California Oceanographic Cooperative

History

Date Founded: 1966
Founders: California State Universities; NSF
Reasons for Founding: To further marine studies

South Dakota School of Mines and Technology

Institute of Atmospheric Sciences
501 East St. Joseph Street
Rapid City, SD 57701 3995

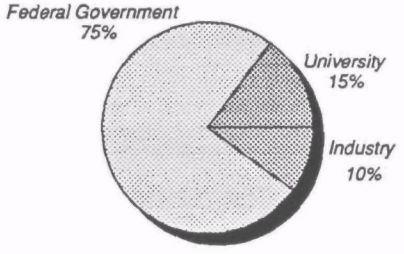
South Dakota School of Mines and Technology's Institute of Atmospheric Sciences concentrates its research on cloud and precipitation physics and small-scale atmospheric circulations. Facilities include a weather office; a data bank of climatological, radar, aircraft and satellite data; a cloud physics laboratory; an electronics laboratory and a computer based remote imaging processing system.

Director: Paul L. Smith
Phone: (605)394-2291

Size and Scope

Number of Personnel:	20	FTEs:	17
Technical:	14	Administrative:	6
Background: PhDs:	6	MSs:	8

Sources of Funding for FY89



University: South Dakota School of Mines and Technology $180,000
Federal Government: NSF; NASA . . . $900,000
Industry: Boeing $120,000

Services Provided

Major Areas of Expertise

- Physical meteorology
- Cloud and precipitation physics
- Small-scale atmospheric calculations
- Air quality studies
- Radiation process
- Remote sensing

Current Activity Mix

- Basic Research 67%
- Applied Research 33%
  Prototype Development
- Unique Specialties: X-ray defraction studies

Major Projects in FY89

1. North Dakota Thunderstorm Project
2. Pennington County Source Apportionment Particulate Study
3. Small-Scale Circulation Studies
4. Cloud Studies (with satellite data) Using Numerical Models
5. Air Quality Studies

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	1
Courses Offered in 1989:	12

Networking Activities

Current Affiliations

- National Center for Atmospheric Research, Boulder, Colorado
- Thunderstorm research in Alabama, Colorado, Florida, Oklahoma, Montana and North Dakota.

International Affiliations

- Thunderstorm research in Canada and Switzerland

History

Date Founded: 1959
Founders: South Dakota Board of Regents
Reasons for Founding: Weather monitoring; modification and atmospheric sciences research

South Dakota State University

Engineering and Environmental Research Center
Box 507
Brookings, SD 57007 199

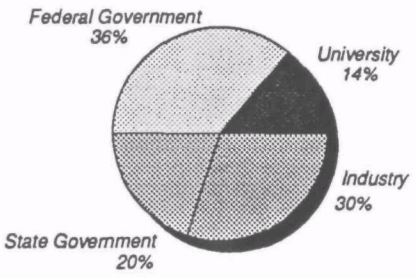
South Dakota State University's Engineering and Environmental Research Center was created to consolidate multidisciplinary research and to enhance South Dakota's economic development by linking university researchers to industry. The center comprises three entities: the Office of Remote Sensing, the Water Resources Institute and the Engineering Experiment Station.

Director: LaDell R. Swiden
Phone: (605)688-4184

Size and Scope

Number of Personnel:	55	FTEs:	41
Technical:	54	Administrative:	1
Background: PhDs:	27	MSs:	18
BSs:	10		

Sources of Funding for FY89



University: South Dakota State University . $140,000
Federal Government: U.S. Geological Survey; NASA Central Industrial Applications Center . $360,000
State Government: Department of Transportation; Department of Water $200,000
Industry: Daktronics; Hutchinson Technology $300,000

Services Provided

Major Areas of Expertise

- Water quality
- Technology transfer
- Remote sensing
- Engineering support for industry
- Geographic information systems

Current Activity Mix

- Basic Research 20%
- Applied Research 80%
  Prototype Development
- Unique Specialties: Geographic information systems; groundwater management research

Major Projects in FY89

1. Rural Clean Water Program
2. Great Plains Water Resource Research Center
3. South Dakota Resource Needs Analysis
4. Airborne Radar Project (VSGS/SLAR)
5. Study of Carbonated Wheat Products

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	4
Other: University/Industry Technology Service	

Networking Activities

Current Affiliations

- NASA Central Industrial Applications Center (CIAC)
- Association of General Contractors
- Brookings Development Corporation

History

Date Founded: 1986
Founders: South Dakota State University Board of Trustees
Reasons for Founding: To enhance South Dakota's economic development by linking university researchers to industry

Stanford University and Oregon State University

Western Region Hazardous Substance Research Center
Department of Civil Engineering
Stanford University
Stanford, CA 94305

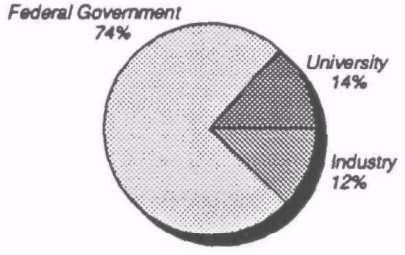
The Western Region Hazardous Substance Research Center is a cooperative effort between Stanford University and Oregon State University. The center was designed to address hazardous substance problems in EPA Regions 9 and 10. The center's objectives are to promote basic and applied research in hazardous waste treatment, and to rapidly disseminate new information to industrial and regulatory communities.

Director: Perry McCarty
Phone: (415)723-4123

Size and Scope

Number of Personnel:	38	FTEs:	25
Technical:	37	Administrative:	1
Background: PhDs:	18	MSs:	6

Sources of Funding for FY89



University: Stanford University; Oregon State University $207,513
Federal Government: EPA; NSF; U.S. Navy; U.S. Air Force $1,130,000
Industry: Gas Research Institute; Electric Power Research Institute; Schlumijerger . . . $186,467

Services Provided

Major Areas of Expertise
- Hazardous substances
- Site remediation
- Treatment
- Groundwater contamination

Current Activity Mix
- Applied Research 100%

Major Projects in FY89

1. Treatment of Complex Mixtures
2. Oxidation of Chlorinated Solvents by Methandrophs
3. In Situ Biological Treatment of Aromatics in Groundwater
4. Fastchem Applications and Sensitivity Analysis
5. Trace Metal Removal Processes

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	1
Annual Report:	October
Courses Offered in 1989:	1

Other: Workshops; short courses

Networking Activities

Current Affiliations
- Oregon State University
- Other EPA Hazardous Substance Research Centers

History

Date Founded: 1989
Founders: EPA; Oregon State University; Stanford University
Reasons for Founding: To research treatment of hazardous substances

Tennessee, University of (Knoxville)

Energy, Environment and Resources Center
327 South Stadium Hall
Knoxville, TN 37996 710

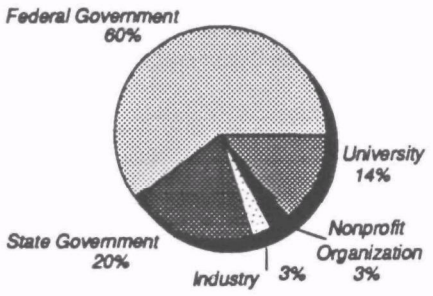
University of Tennessee at Knoxville's Energy, Environment and Resources Center is a multidisciplinary research center dedicated to exploring and resolving critical issues concerning energy, the environment, natural resources and technology. The center operates the Waste Management Research and Education Institute (WMREI) and the Water Resources Research Center (WRRC), and performs analysis for Oak Ridge National Laboratory.

Director: William Colglazier
Phone: (615)974-4251

Size and Scope

Number of Personnel:	60	FTEs:	45
Technical:	45	Administrative:	15
Background: PhDs:	25	MSs:	35

Sources of Funding for FY89



University: University of Tennessee at Knoxville	$910,000
Federal Government: EPA; DOE; TVA	$3,900,000
State Government	$1,300,000
Industry: Martin Marietta	$195,000
Nonprofit Organization	$195,000

Services Provided

Major Areas of Expertise

- Exploring and resolving critical issues concerning energy, environment, natural resources and technology

Current Activity Mix

• Basic Research	20%
• Applied Research	80%
• Market Assessment	
• Products or Processes Commercialized: Biotechnology-related products	

Major Projects in FY89

1. Ethics and Values in Radioactive Waste Management
2. Improving Public Education in Hazardous Waste Management in Tennessee and Assessing Future Treatment and Disposal Capacity Needs
3. Data Management and Information System Development for Storage, Disposal and Transportation of Hazardous Wastes
4. Workshop in Industrial Hazardous Waste Management Practices and Genetic Transfer in Aquatic Environments
5. Solid Waste Survey and Waste Management Assessment Studies

Technology Transfer Mechanisms/ Outreach Programs

Patents Issued in the Last 3 Years: 2

Networking Activities

Current Affiliations

- Operates: The Waste Water Resources Research Center, The Waste Management Research and Education Institute

History

Date Founded: 1972
Reasons for Founding: To carry out interdisciplinary research and problem solving

Tennessee, University of (Knoxville)

Waste Management Research and Education Institute
327 South Stadium Hall
Knoxville, TN 37996 710

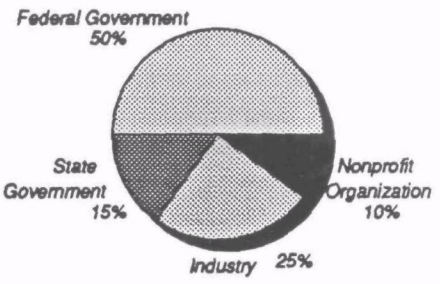
The Waste Management Research and Education Institute at the University of Tennessee, Knoxville, is concerned with finding solutions to society's waste problems through multidisciplinary research and education. The center has a Policy Division which examines the relationships between corporate, regulatory, and public interests, and an Environmental Science and Biology Unit which researches the use of microorganisms in waste cleanup.

Director: William Colglazier
Phone: (615)974-4251

Size and Scope

Number of Personnel:	25	FTEs:	12
Technical:	24	Administrative:	1
Background: PhDs:	20	MSs:	5

Sources of Funding for FY89



Federal Government: DOE; EPA; NSF; TVA $2,350,000
State Government $705,000
Industry: General Electric; Martin Marietta . $1,175,000
Nonprofit Organization: C.S. Mott Foundation $470,000

Services Provided

Major Areas of Expertise

- Chemical, nuclear and solid waste management
- Biotechnology

Current Activity Mix

- Applied Research 100%
- Products or Processes Commercialized: Biotechnology related products
- Unique Specialties: Biotechnology

Major Projects in FY89

1. Ethics and Values in Radioactive Waste Regulation
2. Field Demonstration Analysis of an Anaerobic Treatment Process
3. Genetic Transfer in Aquatic Environments
4. Hydrolic Investigations at Oak Ridge National Laboratory
5. Genetic Approaches for Determining Persistence and Effects of Introduced Species

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	1
Courses Offered in 1989:	2
Patents Issued in the Last 3 Years:	2

Networking Activities

Current Affiliations

- University of Tennessee, Knoxville, Water Resources Research Center
- Vanderbilt University
- University of Tennessee, Knoxville, Energy, Environment and Resources Center

International Affiliations

- Chinese Academy of Sciences, Beijing, Peoples Republic of China

History

Date Founded: 1985
Founders: University of Tennessee, Knoxville
Reasons for Founding: Chartered as a State Center of Excellence

Texas A&M University

Agricultural Engineering Research Center
College Station, TX 77843

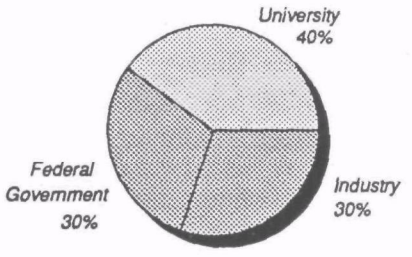
Texas A&M University's Agricultural Engineering Research Center channels its research efforts into four major areas: bioprocessing of food and agricultural products; protein separation and fermenter technology; environmental quality; and air and water quality.

Director: Donald Reddell
Phone: (409)845-3931

Size and Scope

Number of Personnel:	19	FTEs:	19
Technical:	18	Administrative:	1
Background: PhDs:	10	MSs:	9

Sources of Funding for FY89



University: Texas A&M University . . . $840,000
Federal Government $630,000
Industry $630,000

Services Provided

Major Areas of Expertise

- Research on bioprocessing of food and agricultural products;
- Protein separation and fermenter technology
- Environmental quality; air and water quality

Current Activity Mix

- Basic Research 30%
- Applied Research 70%

Major Projects in FY89

1. Institute Treatment T.C.E. Contaminated Ground Water (EPA)
2. Utilization of Remote Sensing to Extract Hydrological Information (U.S. Navy)
3. Evaluating Strength and Cracking Properties of Rice Kernels Due To Drying (Texas Rice Research Institute)
4. Development of New Cotton Gin, The Caged Gin (Cotton Inc.)
5. Development of Technology to Design Fermenters for Biological Fertilization

Technology Transfer Mechanisms/ Outreach Programs

Annual Report:	Summer
Courses Offered in 1989:	5
Patents Issued in the Last 3 Years:	3
Patent Licenses Issued in the Last 3 Years:	2

Networking Activities

Current Affiliations

- Texas Agricultural Association
- Institute of Food, Science and Technology
- Irrigation Society
- American Society of Agricultural Engineers
- American Society of Civil Engineers

International Affiliations

- Cooperative agreement for R&D with Bi-National Agricultural Projects (Israel and U.S.)
- Informal agreement with Australian Meat Board

History

Date Founded: 1932
Reasons for Founding: To further agricultural research

Texas A&M University

Environmental and Water Resources Engineering Division
Civil Engineering Department
College Station, TX 77843 3136

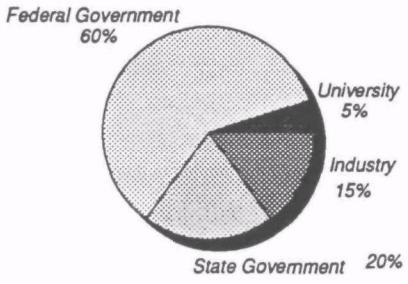
The Environmental and Water Resources Division at Texas A&M University is concerned with evaluating the impact of human activities on the natural environment. The division also conducts research on the design and operation of municipal, industrial, and agricultural water systems.

Director: Bill Batchelor
Phone: (409)845-1304

Size and Scope

Number of Personnel:	35	FTEs:	25
Technical:	31	Administrative:	4
Background: PhDs:	11	MSs:	24

Sources of Funding for FY89



University: Texas A&M University	$75,000
Federal Government: DOI; EPA; NOAA	$900,000
State Government: Texas Higher Education Coordinating Board; Texas Water Commission	$300,000
Industry	$225,000

Services Provided

Major Areas of Expertise

- Municipal, industrial, and agricultural water supply
- Wastewater treatment
- Hazardous waste management; air quality control

Current Activity Mix

• Basic Research	70%
• Applied Research	30%

Major Projects in FY89

1. Transport and Fate of Hazardous Substances
2. Sorption/Desorption Kinetics of Contaminants in Unsaturated Soils
3. Speciation and Behavior of Silica in Recycled Cooling Water
4. Disposal of Dredged Material Offshore

Technology Transfer Mechanisms/ Outreach Programs

Courses Offered in 1989:	4

Networking Activities

Current Affiliations

- Texas Water Resource Institute
- Gulf Coast Hazardous Substance Research Center
- Lamar University

History

Date Founded: 1876
Founders: Texas A&M University

Texas A&M University

Sea Grant College Program
College Station, TX 77843 4115

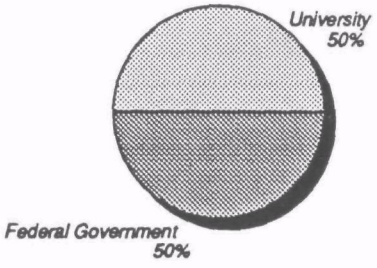
Texas A&M University's Sea Grant College Program is a partnership of university, government and industry, focusing on marine research, education and advisory service. Specialties include marine recreation, fisheries, business management, environmental quality, and seafood marketing technology and consumer education. Fostering international trade competitiveness, exploring marine biotechnology, improving fish technology, and advancing aquaculture are all continuing goals of the program.

Director: Thomas Bright
Phone: (409)845-3854

Size and Scope

Number of Personnel:	30	FTEs:	17
Technical:	14	Administrative:	3
Background: PhDs:	1	MSs:	1
BSs:	15		

Sources of Funding for FY89



University: Texas A&M University . . . $1,600,000
Federal Government: NOAA $1,600,000

Services Provided

Major Areas of Expertise

- Fisheries
- Aquaculture
- Environmental marine policy management

Current Activity Mix

- Applied Research 100%

Major Projects in FY89

1. Cultchless Oysters Project
2. Predictive Methods for Salinity Intrusion in Galveston Bay
3. Physical Gonadotropin Research of Atlantic Croaker and Red Drum Fish
4. Pollutant Metal Removal and Release, Via Reactions with Sedimentary Pyrites
5. Thyroid Hormone Content of Fish Eggs and Larvae

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	3
Courses Offered in 1989:	20

Networking Activities

Current Affiliations

- NOAA
- Marine Advisory Service
- Texas Agricultural Extension
- University of Texas Experiment Station
- Texas Agricultural Experiment Station

History

Date Founded: 1968
Founders: National Sea Grant College Program
Reasons for Founding: To foster wise management and development of marine resources through research, education and advising

Texas A&M University

Texas Agricultural Experiment Station
Systems Building
Room 113
College Station, TX 77843

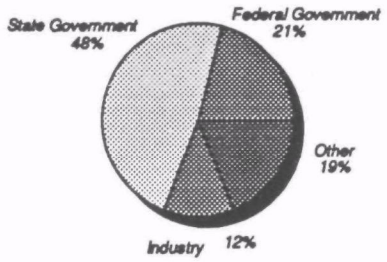
Texas A&M University's Agricultural Experiment Station represents a state/federal partnership oriented to providing wholesome and healthy food for the entire population and to provide the technology for agricultural production, and the efficient processing, transportation and marketing of these products. Additionally, the Experiment Station regulates feed, fertilizers, beekeeping, and the Pullorum and Typhoid control programs.

Director: Charles Arntzen
Phone: (409)845-8484

Size and Scope

Number of Personnel:	2000	FTEs:	500
Technical:	1500	Administrative:	500
Background: PhDs:	500		

Sources of Funding for FY89



Federal Government: USDA; AID; NIH	$20,901,720
State Government	$47,775,360
Industry: Bell Chemical; Ciba Geigy; Shell; Monsanto	$11,943,840
Other: Products, charges and revolving funds	$18,911,080

Services Provided

Major Areas of Expertise

- Animal science
- Biochemistry
- Food technology
- Nutrition
- Natural resources
- Water quality

Current Activity Mix

- Basic Research
- Applied Research
  - Prototype Development
  - Market Assessment
- Products or Processes Commercialized: Basulo Virus Expression System

Major Projects in FY89

1. Engineering Systems for Agricultural Particulate Pollution Abatement
2. The Expanding Dairy Industry: Impact on Groundwater Quality and Quantity
3. Evaluation of the Mutagenic Potential of Municipal Landfill Leachate
4. Effectiveness of Native Species Buffer Zone for Nonstructural Treatment of Urban Runoff
5. Effect of Agricultural Production and Public Policy on Groundwater Quality

Technology Transfer Mechanisms/ Outreach Programs

Patents Issued in the Last 3 Years: 1
Patent Licenses Issued in the Last 3 Years: 2
Other: 14 Texas A&M Agricultural and Research Extension Centers

Networking Activities

Current Affiliations

- Baylor University
- University of Texas

International Affiliations

- Johannes Kepler University Linz, Altenbergerstrasse 69, 4040 Linz-Auhof, Austria
- University of Antwerp (UIA), Universiteitsplein, B-2610 Wilrijk, Belgium
- Nanjing Medical College, Han Zhoung Road, #140, Nanjing, Jiansu Province, People's Republic of China

History

Date Founded: 1887
Founders: Texas Legislature
Reasons for Founding: To meet provisions of the Hatch Act

Texas, University of North

Institute of Applied Sciences
P.O. Box 13078
Denton, TX 76203 3078

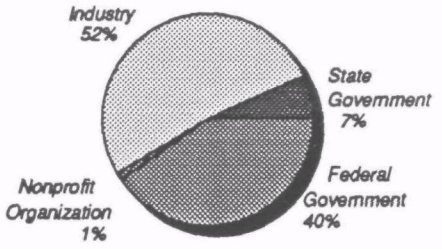
The Institute of Applied Sciences at North Texas State University conducts research and educational activities that seek solutions to issues and problems related to the development of natural and human resources. The institute's specialties include: land and water resources, waste management, toxic substances, and environmental impact.

Director: Kenneth L. Dickson
Phone: (817)565-2694

Size and Scope

Number of Personnel:	54	FTEs:	34
Technical:	49	Administrative:	5
Background: PhDs:	16	MSs:	14
BSs:	19		

Sources of Funding for FY89



Federal Government: EPA; Army Corps of Engineers; U.S. Air Force $756,000
State Government $128,000
Industry: Mobay; Natural Gas Pipeline; Shell; City of Dallas Water Utilities; Exxon . . . $978,000
Nonprofit Organization: Shell Oil Company Foundation; Texas Nature Conservancy . . $22,000

Services Provided

Major Areas of Expertise

- Land, water, energy and human resources
- Waste management
- Toxic substances
- Environmental impact
- Archaeology

Current Activity Mix

- Basic Research 50%
- Applied Research 50%

Major Projects in FY89

1. Lake North Silt Removal Study
2. Remote Sensing and Habitat Mapping for Endangered Species
3. Stress Protein Monitoring
4. Impoundment Studies for Ray Roberts Lake
5. Cultural Resources Investigations at Jones Farm

Networking Activities

Current Affiliations

- EPA

History

Date Founded: 1976
Founders: University of North Texas
Reasons for Founding: To seek solutions to issues and problems related to the development of natural and human resources

Texas, University of (Austin)

Center for Research in Water Resources
10100 Burnett Road
Austin, TX 78758 4497

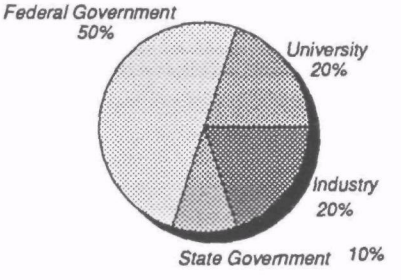
The Center for Research in Water Resources at the University of Texas, Austin, concentrates its research on hydraulics, groundwater processes, hazardous waste management, water quality, and water policy infrastructure. The center strives to broaden the interpretation of water resources to include the social and political aspects of water management.

Director: Randall J. Charbeneau
Phone: (512)471-3131

Size and Scope

Number of Personnel:	19	FTEs:	19
Technical:	14	Administrative:	5
Background: PhDs:	8	MSs:	5
BSs:	6		

Sources of Funding for FY89



University: University of Texas, Austin . . $440,000
Federal Government: EPA; DOE $1,100,000
State Government $220,000
Industry $440,000

Services Provided

Major Areas of Expertise

- Addressing state's water needs through research and education related to conservation
- Water quality
- Efficient use of Texas' water resources

Current Activity Mix

- Basic Research 60%
- Applied Research 40%

Major Projects in FY89

1. Conjunctive Use of Groundwater and Surface Water
2. Hydrology and Reservoir Management
3. Water Reuse and Wastewater Treatment
4. Low Level Radioactive Waste Research
5. Sediment Transport

Technology Transfer Mechanisms/ Outreach Programs

Courses Offered in 1989: 11
Other: Report series (3 issued in 1989)

Networking Activities

Current Affiliations

- Texas A&M University
- L.B.J. School of Public Affairs

History

Date Founded: 1983
Founders: Dr. Ernest Gloyna
Reasons for Founding: To coordinate various facets of University of Texas at Austin involved in water research

Tufts University

Center for Environmental Management
Curtis Hall
474 Boston Avenue
Medford, MA 02155

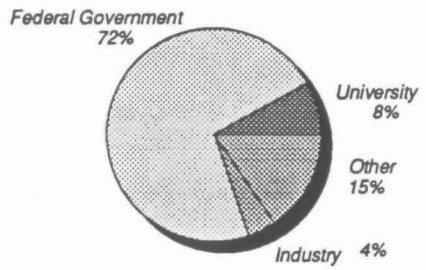
Tufts University Center for Environmental Management (CEM) uses multidisciplinary strategies to develop long-term solutions to pollution problems. CEM's specialties include environmental monitoring, biological markers and ecological risk assessment and management.

Director: Dr. William R. Moomaw
Phone: (617)381-3486

Size and Scope

Number of Personnel:	27	FTEs:	27
Technical:	18	Administrative:	9
Background: PhDs:	4	MSs:	14
BSs:	9		

Sources of Funding for FY89



University:	$397,200
Federal Government: EPA	$3,500,000
Industry:	$210,000
Other: Self-generated income	$750,000

Services Provided

Major Areas of Expertise

- Environmental monitoring;
- Biological markers
- Ecological risk assessment and management

Current Activity Mix

- Basic Research 20%
- Applied Research 80%
  - Prototype Development
  - Field Testing
  - Performance Testing
  - Market Assessment
- Unique Specialties: Training

Major Projects in FY89

1. Development of in situ continuous water quality monitor technologies
2. Information and Education Research Health in Salient and Environmental Health Issues
3. Major Investigation of Corporate Environmental Management, Both Domestic and International
4. Global Climate Change Research
5. Comprehensive Pollution Prevention Research Agenda

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 1
Newsletters per year: 4
Annual reports: October
Courses Offered in 1989: 60
Patents Issued in the Last 3 Years: 3 (2 pending)
Patent Licenses Issued in the Last 3 Years: 1 (1 pending)
Other: Course bulletin (3 times per year); research projects currently funded by CEM; Environmental Resource Guide

Networking Activities

Current Affiliations

- Northeast Hazardous Substance Research Consortium;
- Massachusetts Institute of Technology;
- New Jersey Institute of Technology;
- Boston University;
- New York University Medical Center

International Affiliations

- University of Moscow, Moscow, USSR

History

Date Founded: April 1984

Founder Dr. Anthony Cortese

Reasons for Founding Concern about global security and international competitiveness

Utah State University

Ecology Center
Logan, UT 84322 5205

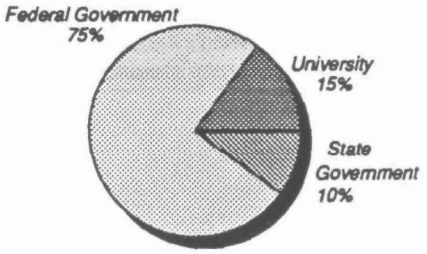
The Ecology Center at Utah State University coordinates environmental research for eight departments of the university including: biology, fisheries and wildlife, forest resources, geology, plant science range science and biometerology, and geography and earth resources.

Director: Frederic H. Wagner
Phone: (801)750-2555

Size and Scope

Number of Personnel:	103	FTEs:	78
Technical:	100	Administrative:	3
Background: PhDs:	50	MSs:	50

Sources of Funding for FY89



University: Utah State University	$450,000
Federal Government: EPA; NSF; USDA; DOE	$2,250,000
State Government	$300,000

Services Provided

Major Areas of Expertise

- Terrestrial and aquatic ecology
- Biology
- Fisheries and wildlife
- Forest resources
- Geology
- Plant science
- Range science
- Soil science
- Biometeorology

Current Activity Mix

• Basic Research	75%
• Applied Research	25%

Major Projects in FY89

1. Effects of Ultra-Violet Radiation on Plant Growth
2. Water Pollution Rate Variance as Desert Vegetation is Altered
3. Plant Ecology and Soils of Great Basin Desert
4. Montane Forest Ecology, Northern Utah
5. Disturbed Mine Lands Restoration

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	2
Courses Offered in 1989:	50

Networking Activities

Current Affiliations

- Association of Ecosystem Research Centers

International Affiliations

- Governments of India, Tunisia
- Hebrew University, Jerusalem, Israel

History

Date Founded: 1966

Founders: Utah State Legislature; NSF

Reasons for Founding: To coordinate and support graduate education and research in ecology

Utah State University

The Huntsman Environmental Research Center
Utah State University
Logan, UT 84322 4445

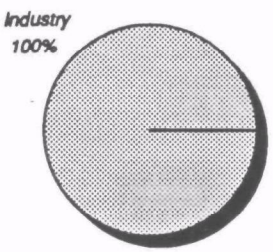
The Huntsman Environmental Research Center at Utah State University is dedicated to research on recycling, waste site decontamination, water quality and the preservation of trees. The center was established to oversee and fund applied research at USU and other colleges and universities through the Western United States.

Director: Larry Piette
Phone: (801)750-1186

Size and Scope

Number of Personnel:	50	FTEs:	45
Technical:	45	Administrative:	5
Background: PhDs:	50		

Sources of Funding for FY89



Industry: Huntsman Chemical $1,000,000

Services Provided

Major Areas of Expertise

- Recycling
- Waste site decontamination
- Water quality
- Air quality
- Forestry

Current Activity Mix

- Basic Research 80%
- Applied Research 20%
  - Prototype Development
  - Market Assessment
- Products or Processes Commercialized: White Rot Fungus

Major Projects in FY89

1. White Rot Fungus Research
2. Densification of Polystyrofoam
3. Arid Land Ecology
4. Microbial Decontamination Process
5. Recycling Research

Technology Transfer Mechanisms/ Outreach Programs

Patents Issued in the Last 3 Years:	3
Patent Licenses Issued in the Last 3 Years:	1

Networking Activities

Current Affiliations

- Umbrella for: Utah State University
- Ecology Center
- Water Research Lab
- Toxicology Center
- Biotechnology Center
- Environmental Engineering Research Center

History

Date Founded: 1989
Founders: Utah State University; Jon Huntsman
Reasons for Founding: Huntsman Chemical Corportion Grant

Utah State University

Utah Water Research Laboratory
Logan, UT 84322 8200

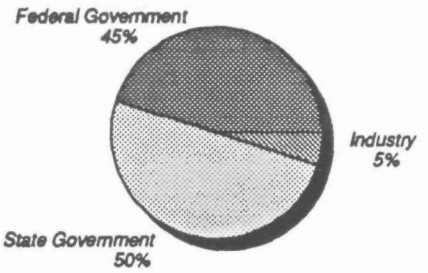
Utah State University's Utah Water Research Laboratory combines practical problem solving and effective water education and training programs. The laboratory brings a wide perspective, recognized specialized expertise and many years of practical experience into such diverse areas as: hydraulic testing; erosion studies and water quality analysis; experimental research; numerical analysis and computer modeling; and expert short-term consulting.

Director: L. Douglas James
Phone: (801)750-3168

Size and Scope

Number of Personnel:	190	FTEs:	150
Technical:	16 5	Administrative:	25
Background: PhDs:	70	MSs:	75
BSs:	20		

Sources of Funding for FY89



Federal Government: EPA; U.S. Geological Survey; National Institute of Environmental Health Sciences; U.S. Air Force $1,125,000
State Government $1,250,000
Industry: Electric Power Research Institute . $125,000

Services Provided

Major Areas of Expertise

- Hydraulic testing
- Erosion studies
- Water quality analysis
- Numerical analysis
- Computer modeling

Current Activity Mix

- Basic Research 25%
- Applied Research 75%
  Market Assessment
- Unique Specialties: Rainfall simulator; hydraulic modeling

Major Projects in FY89

1. Hazardous Waste Management (Air Emissions from Soil; Mining Waste Impact and Treatment; Fate and Transport Modeling)
2. Natural Systems (Great Salt Lake, Bear River)
3. Industrial/Municipal Waste Treatment (Bio-film System Modeling; Sludge Management; Dairy Waste Treatment)
4. On-site Waste Disposal (Septic Tank Drain Fields; Groundwater Impacts; Alternative On-site Disposal Systems)
5. Water Treatment (Slow Sand Filtration; Home Water Purifiers)

Technology Transfer Mechanisms/ Outreach Programs

Annual Report: Biennial

Networking Activities

Current Affiliations

- National Association of Water Institute Directors

International Affiliations

- USAID program in Pune, India

History

Date Founded: 1964
Founders: University and State Legislature

Virginia Polytechnic Institute and State University

Center for Environmental and Hazardous Materials Studies
1020 Derring Hall
Blacksburg, VA 24061 415

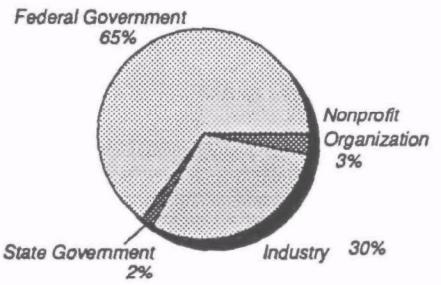
Virginia Polytechnic Institute and State University's University Center for Environmental Studies was established to carry out interdisciplinary research on environmental problems, and to help government, industry, and the public to use this information effectively. The center has expertise in restoration of damaged ecosystems, hazardous waste storage sitings and toxicity testing.

Director: John Cairns, Jr.
Phone: (703)231-7075

Size and Scope

Number of Personnel:	28	FTEs:	25
Technical:	23	Administrative:	5
Background: PhDs:	22	MSs:	5

Sources of Funding for FY89



Federal Government: NSF; EPA $552,500
State Government $17,000
Industry $255,000
Nonprofit Organization $25,500

Services Provided

Major Areas of Expertise

- Restoration of damaged ecosystems
- Hazardous waste storage sitings
- Toxicity testing

Current Activity Mix

- Basic Research 90%
- Applied Research 10%
- Unique Specialties: Multispecies toxicity testing; restoration ecology; biological monitoring

Major Projects in FY89

1. Eradication of Pesticides (Asiatic Clam, Zebra Clam)
2. Recovery and Restoration of Damaged Ecosystems
3. Acute Toxicity, Chronic Impairment and Recovery of the Snail from Copper Dominated Effluent Exposures
4. Methylene Blue as a Fitness Indicator in Laraval Fish Testing
5. Effects of Enrichment and Plant Interactions on Survival and Detection of Genetic Alterations

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 2
Annual Report: January

Networking Activities

Current Affiliations

- Hazardous Waste Institute Directors

International Affiliations

- Institute of Hydrobiology, Wuhan, Peoples Republic of China
- Environmental Center, Nanjing University, Peoples Republic of China

History

Date Founded: 1970
Founders: Board of Visitors (trustees)
Reasons for Founding: To provide neutral ground for interdisciplinary work

Virginia Polytechnic Institute and State University

Virginia Cooperative Fish and Wildlife Research Unit
106 Cheatham Hall
Blacksburg, VA 24061

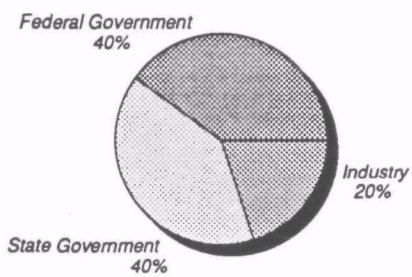
Virginia Polytechnic Institute and State University's Virginia Cooperative Fish and Wildlife Research Unit operates as a cooperative arrangement between the U.S. Fish and Wildlife Service, Virginia Department of Game and Inland Fisheries, and the Wildlife Management Institute. The unit emphasizes stream ecology, wildlife ecology and endangered species studies; and wet laboratory and behavior laboratory facilities are maintained.

Director: Richard Neves, Unit Leader
Phone: (703)231-5927

Size and Scope

Number of Personnel:	17	FTEs:	5
Technical:	15	Administrative:	2
Background: PhDs:	4	MSs:	12

Sources of Funding for FY89



Federal Government	$400,000
State Government	$400,000
Industry	$200,000

Services Provided

Major Areas of Expertise

- Endangered species
- Anadromous fish
- Big game management
- Black bear research
- Stream ecology

Current Activity Mix

- Basic Research 50%
- Applied Research 50%

Major Projects in FY89

1. Population Biology and Acid Tolerance of Fresh Water Crayfish
2. Life History of the Endangered Fine Rayed Pigtoe Pearly Muscle
3. Population Characteristics and Ecology of Black Bears in Shenandoah National Park
4. Population and Ecology of Jack Rabbits on Cobb Island, Virginia
5. Development of Techniques for Propagation of Threatened Fish Species in Virginia

Technology Transfer Mechanisms/ Outreach Programs

Annual Report:	October
Courses Offered in 1989:	1
Other	Scientific journal articles

Networking Activities

Current Affiliations

- Cooperative Research Unit Center of the Fish and Wildlife Service

History

Date Founded: 1985

Founders: U.S. Government; Virginia Department of Game

Reasons for Founding: To produce graduate students in Fish and Wildlife

Washington State University

State of Washington Water Research Center
Pullman, WA 99164 3002

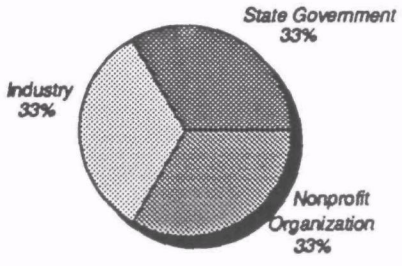
The State of Washington Water Research Center at Washington State University is involved in coordinating research teams, training, sampling and testing and information dissemination regarding water resources.

Director: William H. Funk
Phone: (509)335-5531

Size and Scope

Number of Personnel:	8	FTEs:	6
Technical:	2	Administrative:	6
Background: PhDs:	2		

Sources of Funding for FY89



Federal Government: U.S. Geological Survey	$333,333
State Government	$333,333
Industry	$333,333

Services Provided

Major Areas of Expertise

- Coordinating research teams
- Training
- Sampling and testing
- Fundraising
- Information dissemination

Current Activity Mix

- Basic Research 25%
- Applied Research 75%
  Prototype Development
- Products or Processes Commercialized: Will help business perfect testing processes
- Unique Specialties: Lake restoration

Major Projects in FY89

1. Water Efficiency Studies
2. Improved Dams/Hydro-Electric Power
3. Lake Restoration

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	6
Annual Report:	May

Networking Activities

Current Affiliations

- National Association of Water Institute Directors

History

Date Founded: 1964

Founders: State of Washington

Reasons for Founding: To inventory state water resources

Wisconsin, University of (Madison)

Institute for Environmental Studies (IES)
1007 Wharf Office Building
610 Walnut Street
Madison, WI 53705

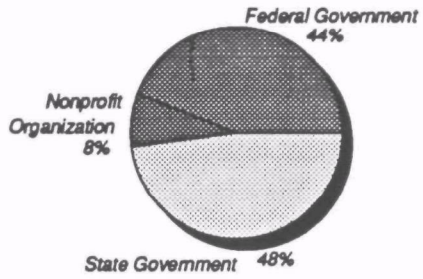
University of Wisconsin, Madison's Institute for Environmental Studies is a comprehensive, independent academic unit designed to study interrelationships between people and the environment. The institute encompasses seven research centers: Center for Biotic Systems, Center for Climatic Research, Center for Environmental Policy Studies, Environmental Remote Sensing Center, Center for Human Systems, Center for Land Information Studies, and Marine Studies Center.

Director: Arthur B. Sacks
Phone: (608)262-5957

Size and Scope

Number of Personnel:	55	FTEs:	33
Technical:	45	Administrative:	10
Background: PhDs:	22		

Sources of Funding for FY89



Federal Government: NSF; NASA; NOAA; U.S. Geological Survey $1,100,000
State Government $1,200,000
Nonprofit Organization: Hewlett Foundation $200,000

Services Provided

Major Areas of Expertise

- Environmental monitoring
- Land and water resource management
- Energy analysis

Current Activity Mix

- Basic Research
- Applied Research

Major Projects in FY89

1. Adaptations of Aquatic Plants to Oligotrophic Lakes
2. Using Environmental Indicators to Construct a History of Climate Changes Based on Global Data
3. Employing Computer-Enhanced Imagery to Help Detect and Manage Hazardous Waste Disposal Sites
4. Consequences to Newborn Babies of Comsumption by Their Mothers During Pregnancy of Lake Michigan Fish Contaminated with Polychlorinated Biphenyls (PCB)
5. Compiling Information on Consumptive Uses of Great Lakes Water by the States and Canadian Provinces

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year:	6
Annual Report:	July

Networking Activities

Current Affiliations

- International Society for Environmental Education, Columbus, Ohio
- North American Association for Environmental Education;
- International Network for Research Inventory Center, Dartmouth College

History

Date Founded: 1967
Founders: University of Wisconsin, Madison
Reasons for Founding: Education, interdisciplinary research, and public outreach

Wisconsin, University of (Madison)

Water Chemistry Program
660 North Park Street
Madison, WI 53706

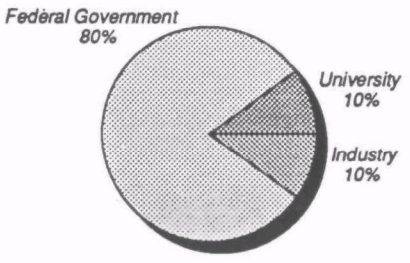
University of Wisconsin, Madison's Water Chemistry Program applies principles of chemistry to pollutants in air, surface water and groundwater. Particular emphasis is placed on lake research (hazardous organic compounds, atmospheric input of chemicals, trace metal chemicals). Fields of study also include aqueous systems, photochemical reactions and ceramic membranes.

Director: D.E. Armstrong (Head)
Phone: (608)262-2470

Size and Scope

Number of Personnel:	40	FTEs:	35
Technical:	37	Administrative:	3
Background: PhDs:	10	MSs:	25

Sources of Funding for FY89



University: University of Wisconsin, Madison $100,000
Federal Government $800,000
Industry $100,000

Services Provided

Major Areas of Expertise

- Applications of chemistry to problems in air, surface water and ground water
- Fate assessment of organic chemicals in the environment
- Development of ceramic materials via photocatalysis

Current Activity Mix

- Basic Research 95%
- Applied Research 5%

Prototype Development

Major Projects in FY89

1. Use of Ceramic Materials for Photocatalysis
2. Fate Assessment of Organic Chemicals in the Great Lakes
3. Particle Mediated Reactions of Organic Chemicals in Lakes
4. Diagenesis of Fitoplankton Pigment in Lakes
5. Chemical Properties Estimated for Organic Chemicals

Technology Transfer Mechanisms/ Outreach Programs

Other: Seminars and publications

History

Date Founded: 1961

Reasons for Founding: To study water pollutants through the principles of chemistry

Wisconsin, University of (Madison)

Water Resources Center
1975 Willow Drive
Madison, WI 53706

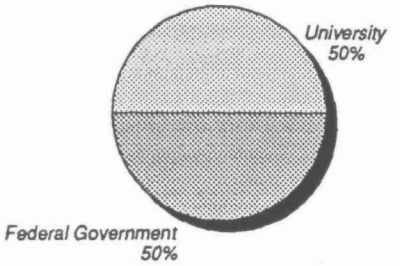
The University of Wisconsin, Madison's Water Resources Center provides a program of research, education and information dissemination on problems of Wisconsin, the north central region, and the rest of the nation. The center's research focuses on groundwater evaluation.

Director: Gordon Chesters
Phone: (608)262-3577

Size and Scope

Number of Personnel:	24	FTEs:	16
Technical:	16	Administrative:	8

Sources of Funding for FY89



University: University of Wisconsin, Madison $625,000
Federal Government: U.S.Geological Survey; NSF; EPA; USDA; DOE $625,000

Services Provided

Major Areas of Expertise

- To coordinate research on water resources at the university, other Wisconsin colleges, universities and state agencies
- Technology transfer
- Groundwater evaluation (quality, transport, toxicology)

Current Activity Mix

- Basic Research 33%
- Applied Research 67%
- Unique Specialties: Coated ceramic membranes as filters

Major Projects in FY89

1. Preferential Water Flow Through Soil
2. Herbicides and Decontamination of Groundwater
3. Potential Groundwater Impacts from Management Techniques Designed to Abate Nonpoint Pollutants to Surface Waters
4. Photocatalysis of Halogenated Hydrocarbons Using Hydrous Oxides and Ordered Ceramic Membranes
5. Mitochondrial Bioassay for Toxic Substances in Water

Technology Transfer Mechanisms/ Outreach Programs

Annual Report:	December
Patents Issued in the Last 3 Years:	2

Networking Activities

Current Affiliations

- Michigan State University
- U.S.Geological Survey
- Great Lakes Regional Network

International Affiliations
- Envirotech, Vienna, Austria
- International Society for Environmental Protection
- UNESCO
- National Research Council of Italy, Venice, Italy
- International Water Resources Association
- U.S. and Canada, International Joint Commission on Management Strategies for the Great Lakes, Buffalo, New York

History

Date Founded: 1964
Founders: Water Resources Research Act of 1964
Reasons for Founding: To advise on groundwater management and cleanup

Wyoming, University of

Wyoming Water Research Center
Box 3067
University Station
Laramie, WY 82071 3067

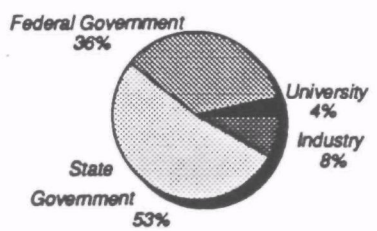
The Wyoming Water Research Center at the University of Wyoming sponsors and conducts multidisciplinary research related to the management and preservation of Wyoming's water resources. The center investigates the legal, engineering, geological, political, social and environmental factors at work in water issues.

Director: Steven P. Gloss
Phone: (307)766-2143

Size and Scope

Number of Personnel:	71	FTEs:	59
Technical:	64	Administrative:	7
Background: PhDs:	40	MSs:	12
BSs:	12		

Sources of Funding for FY89



University: University of Wyoming	$56,000
Federal Government: U.S. Geological Survey	$570,000
State Government	$840,000
Industry	$129,000

Services Provided

Major Areas of Expertise
- Groundwater quality
- Fisheries
- Resource economics
- Geography
- Water development
- Modeling

Current Activity Mix

• Basic Research	50%
• Applied Research	50%

- Unique Specialties: Water Resources Data System (WRDS)

Major Projects in FY89

1. Satellite Imagery
2. Groundwater Contaminant Detection
3. Riparian Zone Management
4. Little Horse Creek Loss Study
5. Furrow Irrigation Efficiency

Technology Transfer Mechanisms/ Outreach Programs

Symposia per Year: 3
Annual Report: December
Other: Hotline Number: (307)766-6651 Available to anyone

Networking Activities

Current Affiliations
- U.S. Geological Survey

International Affiliations
- U.S. Agency for International Development (project in Swaziland)

History

Date Founded: 1964
Founders: State of Wyoming
Reasons for Founding: Long-range Wyoming water development program

Appendix

This Appendix to the Directory lists cooperative university and industry environmental R&D centers that are not included in the body of the directory because their funding levels are below $1 million per year. These centers are listed to inform the user of their existence and to provide a point of contact at each center.

Academy of Natural Sciences
Division of Environmental Research
19th Street and the Parkway
Philadelphia, PA 19103

Director: Louis E. Sage
Phone: (215)299-1081

Agricultural Research Institute
9650 Rockville Pike
Bethesda, MD 20814

Director: William Stanwood Cath
Phone: (301)530-7122

American Iron and Steel Institute
1133 15th Street N.W.
Washington, DC 20005 2701

Director: William E. Dennis
Phone: (202)452-7265

American Petroleum Institute
1220 L Street N.W.
Washington, DC 20005

Director: Charles J. DiBona
Phone: (202)682-8000

Arizona State University
Center for Research in Engineering & Applied Sciences
Tempe, AZ 85287 5506

Director: Charles E. Backus
Phone: (602)965-2975

Arizona State University
Laboratory of Climatology
Tempe, AZ 85287

Director: Anthony J. Brazel
Phone: (602)965-6265

Arkansas Tech University
Arkansas Mining and Mineral Resources Research Institute
Arkansas Mining Institute
Russellville, AK 72801

Director: Henry L. Barwood
Phone: (501)968-0201

Batelle Science and Government Study Center
4000 N.E. 41st Street
Seattle, WA 98105

Phone: (206)525-3130

Baylor University
Institute of Environmental Studies
CSB Box 402
Waco, TX 76798

Director: W. Merle Alexander
Phone: (817)755-3406

Bemidji State University
Center for Environmental Studies
Bemidji, MN 56601

Director: Steven A. Spigarelli
Phone: (218)755-2910

Boston University
Center for Energy and Environmental Studies
648 Beacon Street
Boston, MA

Director: T.R. Lakshamanan
Phone: (617)353-3083

Bowdoin College
Marine Station
Brunswick, ME

Director: Edward S. Gilfillan
Phone: (207)725-3000

Brigham Young University
Aquatic Ecosystem Analysis Laboratory
105 Page Street
Provo, UT 84602

Director: Fred A. Mangum
Phone: (801)378-4928

Brigham Young University
Environmental Analysis Laboratory
368-R CB
Provo, UT 84602

Director: LaVere B. Merritt
Phone: (801)378-2972

California Air Resources Board
Sacramento, CA

Phone: (916)445-0753

California Institute of Technology
Environmental Quality Laboratory
105-96
Pasadena, CA 91125

Director: Norman Brooks
Phone: (818)356-4167

California State College, Bakersfield
Center for Environmental Studies
9001 Stockdale Highway
Bakersfield, CA 93311 1099

Director: Ted D. Murphy
Phone: (805)664-3167

Center for Public Interest Research
220 North Chestnut
Lansing, MI 48933

Director: Donald J. Rounds
Phone: (517)487-6001

Center for Short-Lived Phenomena
P.O. Box 199
Harvard Square Station
Cambridge, MA

Director: Richard Golob
Phone: (617)492-3310

City College of City University of New York
Institute of Marine and Atmospheric Sciences
Science Building
138th Street and Convent Avenue
New York, NY 10031

Director: John H. Tietjen
Phone: (212)690-6800

Clarkson University
Environmental Science and Engineering Program
Rowley Laboratories
Potsdam, NY 13676

Director: Thomas L. Theis
Phone: (315)268-3853

Clemson University
Clemson Hydraulics Laboratory
Lowry Hall
Clemson, SC 29631

Director: Ben L. Sill
Phone: (803)656-3325

Clemson University
Water Resources Research Institute
310 Lowry Hall
Clemson, SC 29634 2900

Director: Paul B. Zielinski
Phone: (803)656-3271

Connecticut Agricultural Experiment Station
123 Huntington Street
P.O. Box 1106
New Haven, CT

Director: John F. Anderson
Phone: (203)789-7272

Coordinating Research Council, Inc.
219 Perimeter Center Parkway
Atlanta, GA 30346

Director: Alan E. Zengel
Phone: (404)396-3400

Cornell University
Toxic Chemicals Laboratory
New York State College of Agriculture
Tower Road
Ithaca, NY 14853

Director: Donald J. Lisk
Phone: (607)255-4538

Cranbrook Institute of Science
500 Lone Pine Road
P.O. Box 801
Bloomfield Hills, MI 48013

Director: Robert M. West
Phone: (313)645-3260

Delaware State College
Agricultural Experiment Station
Dover, DE 19901

Director: Ulysses S. Washington
Phone: (302)736-4929

Drexel University
Environmental Studies Institute
Philadelphia, PA 19104

Director: Herbert E. Allen
Phone: (215)895-2265

Environmental Action Foundation
1525 New Hampshire Avenue N.W.
Washington, DC 20036

Director: Ruth Caplan
Phone: (202)745-4870

Environmental Defense Fund
257 Park Avenue South
New York, NY 10010

Director: Frederic D. Krupp
Phone: (212)505-2100

Environmental Hazards Management Institute
137 High Street
Box 283
Portsmouth, NH

Director: Alan J. Borner
Phone: (603)436-3950

Farallones Institute
Center for Sustainable Agriculture
2318 Bree Lane
Davis, CA 95616

Director: David Katz
Phone: (916)756-7177

Florida State University
Center for Aquatic Research & Resource Management
136-B Conradi Building
Tallahassee, FL 32306

Director: Robert J. Livingston
Phone: (904)644-4887

Gulf South Research Institute
P.O. Box 14787
Baton Rouge, LA 70898

Director: James H. Clinton
Phone: (504)766-3300

Heidelberg College
Water Quality Laboratory
Tiffin, OH 44883

Director: David Baker
Phone: (419)448-2201

IIT Research Institute
10 West 35th Street
Chicago, IL 60616

Director: David L. Morrison
Phone: (312)567-4000

Indiana State University
Remote Sensing Laboratory
Department of Geography and Geology
Terra Haute, IN 47809

Director: John Harrington
Phone: (812)237-2264

Indiana University
Environmental Systems Application Center
School of Public and Environmental Affairs
Bloomington, IN 47405

Director: William W. Jones
Phone: (812)335-4556

International Fabricare Institute
12251 Tech Road
Montgomery Industrial Park
Silver Spring, MD 20904

Director: Elizabeth Mooreland
Phone: (301)622-1900

Johns Hopkins University
Chesapeake Bay Institute
4800 Atwell Road
Shady Side, MD 20764

Director: James D. Ebert
Phone: (301)867-7550

Johns Hopkins University
Chesapeake Research Consortium
P.O. Box 1120
Gloucester Point, VA 23062

Director: Maurice P. Lynch
Phone: (804)642-7153

Kansas State University
Kansas Water Resources Research Institute
144 Waters Hall
Kansas State University
Manhattan, KS 66506

Director: Hyde S. Jacobs
Phone: (913)532-5729

Kent State University
Center for Aquatic Ecology
Biological Sciences
Kent, OH 44242

Director: G. Dennis Cooke
Phone: (216)672-3613

Lenox Institute for Research Inc.
101 Yokun Avenue
Lenox, MA

Director: Lawrence K. Wang
Phone: (413)637-3025

Loma Linda University
Survey Research Service
Nichol Hall
Loma Linda, CA 92350

Director: Jan Kuzma
Phone: (714)824-4591

Marine Biological Laboratory
Woods Hole, MA

Director: Harlyn O. Halvorson
Phone: (508)548-3705

Marine Resources Research Institute
South Carolina Wildlife and Marine Resources Department
Charleston, SC 29412

Director: Victor G. Burrell, Jr.
Phone: (803)795-6350

Memphis State University
Institute for Engineering Research
Memphis, TN 38152

Director: Gerald Jacubowski
Phone: (901)678-2718

Midwest Research Institute
425 Volker Blvd
Kansas City, MO 64110 2299

Director: John C. McKelvey
Phone: (816)753-7600

Mileau Foundation
San Jose, CA

Phone: (408)723-2167

Montana State University
Institute of Natural Resources
Bozeman, MT 59717

Phone: (406)994-2432

Monte Marine Laboratory
1600 City Island Park
Sarasota, FL 33577

Phone: (813)388-4441

National Council of the Paper Industry for Air and Stream Improvement, Inc.
260 Madison Avenue
New York, NY 10016

Director: Isiah Gellman
Phone: (212)532-9000

National Food Processors Association Research Foundation
1401 New York Avenue
Washington, DC 20005

Director: Dennis R. Heldman
Phone: (202)639-5955

Natural Energy Laboratory of Hawaii
P.O. Box 1749
Keahole Point
Kailua-Kona, HI 96745
Director: Thomas H. Daniel
Phone: (808)329-7341

New Jersey Institute of Technology
Center for Urban and Environmental Engineering
323 Dr. Martin Luther King Jr., Blvd
Newark, NJ
Director: Harold Deutschman
Phone: (201)596-2467

New York University
Laboratory of Microbial Ecology
753 Brown Building
New York, NY 10003
Director: Guenther Stotzky
Phone: (212)998-8266

North Carolina State University
Southeastern Plant Environment Laboratory
Box 7618
Gardner
Raleigh, NC 27695
Director: Robert Jack Downs
Phone: (919)737-2778

Northeastern Illinois University
International Association for Advancement of Earth and Environmental Sciences
Department of Geography and Environmental Studies
5500 North St. Louis Avenue
Chicago, IL 60625
Director: Musa Qutub
Phone: (312)794-2628

Nova University
Institute of Marine and Coastal Studies
8000 North Ocean Drive
Dania, FL 33004
Director: Richard Dodge
Phone: (305)475-7300

Ohio State University
Engineering Experiment Station
2070 Neil Avenue
Columbus, OH 43210
Director: Robert F. Redmond
Phone: (614)292-2411

Ohio State University
Laboratory for Environmental Studies
Ohio Agricultural Research & Development Center
Madison Avenue
Wooster, OH 44691
Director: T. Craig Weidensaul
Phone: (216)263-3700

Oklahoma State University
Center for Applications of Remote Sensing
111 Thatcher Hall
Stillwater, OK 74078
Director: Mark S. Gregory
Phone: (405)744-5000

Oklahoma State University
Water Quality Research Laboratory
Stillwater, OK 74074
Director: Sterling L. Burks
Phone: (405)624-4551

Oregon State University
Oak Creek Laboratory of Biology
Department of Fisheries and Wildlife
Corvallis, OR 97331
Director: Charles E. Warren
Phone: (503)754-3503

Oregon State University
Water Resources Research Institute
Strand Agriculture Hall
Room 210
Corvallis, OR 97331 2208
Director: Benno P. Warkentin
Phone: (503)737-4022

Pennsylvania State University
Center for Air Environmental Studies
226 Feuske Laboratory
University Park, PA 16802
Director: Mr. Ready
Phone: (814)865-1415

Pennsylvania State University
Engineering Research Program
101 Hammond Building
University Park, PA 16802
Director: Thomas A. Seliga
Phone: (814)865-4542

Pennsylvania State University
Office of Hazardous and Toxic Waste Management
Land and Water Resources Research Building
University Park, PA 16802

Director: Raymond W. Regan
Phone: (814)863-0291

Pennsylvania State University
Soil and Environmental Chemistry Laboratory
104 Research Unit A
University Park, PA 16802

Director: Dale E. Baker
Phone: (814)865-1221

Polytechnic Institute of New York
Center for Fire Research
333 Jay Street
Brooklyn, NY 11201

Director: Mr. Goodman
Phone: (718)260-3600

Purdue University
Department of Medicinal Chemistry,
Bionucleonics Division
West Lafayette, IN 47907

Director: Paul L. Ziemer
Phone: (317)494-1419

Rensselaer Polytechnic Institute
Fresh Water Institute
Troy, NY 12181

Director: Charles W. Boylen
Phone: (518)276-6757

Resources for the Future, Quality of the Environment Division
1616 P Street N.W.
Washington, DC 20036

Director: Raymond J. Kopp
Phone: (202)328-5000

Rutgers University
Center for Coastal and Environmental Studies
Division of Water Resources
Doolittle Hall
New Brunswick, NJ

Director: Alan McIntosh
Phone: (201)932-3596

South Dakota State University
Engineering Experiment Station
Box 2219
Brookings, SD 57007

Director: LaDell Swiden
Phone: (605)688-4184

South Dakota State University
Water Resources Institute
Brookings, SD 57007

Director: Alan R. Bender
Phone: (605)688-4910

Southwest Research Institute
6220 Cullebra Road
P.O. Drawer 28510
San Antonio, TX 78284

Director: Martin Goland
Phone: (512)684-5111

Southwest Research and Information Center
P.O. Box 4524
Albuquerque, NM 87106

Director: Don Hancock
Phone: (505)262-1862

State University College at Buffalo
Great Lakes Laboratory
1300 Elmwood Avenue
Buffalo, NY 14222

Director: Harish C. Sikka
Phone: (716)878-5422

State University College at Oswego
Research Center
King Hall
Oswego, NY 13126

Director: R.J. Scrudato
Phone: (315)341-3639

State University of New York at Buffalo
Toxicology Research Center
127 Farber Hall
Buffalo, NY 14214

Director: Paul Kostyniak
Phone: (716)831-2125

Stevens Institute of Technology
Energy Center
Department of Mechanical Engineering
Castle Point Station
Hoboken, NJ

Director: Rich S. Magee
Phone: (201)420-5592

Syracuse Research Corporation
Merrill Lane
Syracuse, NY 13210

Director: Kenneth A. Kun
Phone: (315)425-5100

Texas A&M University
Texas Forest Products Laboratory
P.O. Box 310
Lufkin, TX 75901

Director: Dewayne Weldon
Phone: (409)639-8180

Texas Tech University
Water Resources Center
Box 4630
Lubbock, TX 79409

Director: Lloyd V. Urban
Phone: (806)742-3597

Tulane University
Environmental Health Sciences Research Laboratory
F. Edward Herbert Research Center
Belle Chasse, LA 70037

Director: A.A. Abdelghani
Phone: (504)394-2233

U.S. Water Conversation Laboratory
4331 East Broadway
Phoenix, AZ 85040

Director: Herman Bouwer
Phone: (602)261-4356

University of Arizona
Environmental Engineering Laboratory
Civil Engineering Department
Room 206
Tucson, AZ 85721

Director: Robert A. Phillips
Phone: (602)621-2315

University of Arizona
Nuclear Fuel Cycle Research Program
Department of Nuclear and Energy Engineering
Tucson, AZ 85721

Director: James G. McGray
Phone: (602)621-4985

University of California
Lawrence-Berkeley Laboratory,
Materials and Chemicals Sciences Division
Building 62
1 Cyclotron Road
Berkeley, CA 94720

Director: Norman E. Phillips
Phone: (415)486-6062

University of California, Berkeley
Hydraulic Laboratories
412 O'Brien Hall
Berkeley, CA 94720

Director: Richard A. Denton
Phone: (415)642-6777

University of Chicago
Cloud Physics Laboratory
Department of Geophysical Sciences
5734 S. Ellis Avenue
Chicago, IL 60637

Director: R.R. Braham
Phone: (312)702-8123

University of Cincinnati
Department of Environmental Health
3223 Eden Avenue
Cincinnati, OH 45267

Director: Roy E. Albert
Phone: (513)556-6000

University of Colorado, Denver
Center for Environmental Sciences
Campus Box 136
1100 14th Street
Denver, CO 80202

Director: Herman Seivering
Phone: (303)556-4277

University of Delaware
Water Resources Center
101 Hullihen Hall
Newark, DE 19716
Director: Robert D. Varrin
Phone: (302)451-2191

University of Florida
Air Pollution Research Laboratory
Gainesville, FL 32611
Director: Dale Lundgren
Phone: (904)392-0846

University of Florida
Interdisciplinary Center for Aeronomy and other Atmospheric Sciences
311 Space Sciences Research Building
Gainesville, FL 32611
Director: Alex E.S. Green
Phone: (904)392-2001

University of Illinois
Illinois Natural History Survey
Natural Resources Building
607 East Peabody
Champaign, IL 61820
Director: Lorin I. Nevling
Phone: (217)333-6830

University of Kansas
John H. Nelson Environmental Study Area (NESA)
Division of Biological Sciences
Lawrence, KS 66047 2906
Director: K.B. Armitage
Phone: (913)864-3236

University of Kansas
Kansas Biological Survey
2291 Irving Hill Drive
Lawrence, KS 66047 2906
Director: Edward A. Martinko
Phone: (913)864-7725

University of Kansas
Water Resources Institute
Lawrence, KS 66047 2906
Director: Ernest C. Pogge
Phone: (913)864-3807

University of Kentucky
Kentucky Water Resources Research Institute
219 Anderson Hall
Lexington, KY 40506
Director: Ralph Huffsey
Phone: (606)257-1832

University of Maryland
Water Resources Research Center
0313 Symons Hall
College Park, MD 20742
Director: Robert E. Menzer
Phone: (301)454-6406

University of Massachusetts
Massachusetts Water Resources Research Center
Blaisdell House
Amherst, MA
Director: Paul J. Godfrey
Phone: (413)545-2842

University of Miami
Pesticide Residue and Toxic Waste Analytical Laboratory
Room 108, Building B
12500 S.W. 152 Street
Miami, FL 33177 1411
Director: John Davies
Phone: (305)284-7320

University of Michigan
Michigan Atmospheric Deposition Laboratory
2126 Space Research Building
Ann Arbor, MI 48109 2143
Director: Perry J. Sampson
Phone: (313)764-3360

University of Michigan
Montgomery Allergy Research Laboratory
6621 Kresge Medical Research Building 1
Box 0529
Ann Arbor, MI 48109
Director: William Solomon
Phone: (313)764-0227

University of Michigan
Radiation Safety Service/OSHA
North University Building
Room 1101
Ann Arbor, MI 48109 1057
Director: Mark Driscall
Phone: (313)764-4420

University of Minnesota
Fire Information Research & Education Center
33 North Hall
2005 Buford
St. Paul, MN 55108

Director: Helen Henry
Phone: (612)296-6516

University of Missouri, Columbia
Missouri Water Resources Research Center
Room 56
Civil Engineering
Columbia, MO 65211

Director: Thomas E. Clevenger
Phone: (314)882-3132

University of Missouri, Rolla
Environmental Research Center
Rolla, MO 65401

Director: Ju-Chang Huang
Phone: (314)341-4461

University of Missouri, Rolla
Missouri Mining and Mineral Resources Research Institute
272 McNuff Hall
Rolla, MO 65401

Director: John L. Watson
Phone: (314)341-4724

University of Montana
Gordon Environmental Studies Laboratory
Botany Department
Missoula, MT 59812

Director: Peter M. Rice
Phone: (406)243-2671

University of New Hampshire
Engineering Design & Analysis Laboratory
Kingsbury Hall 101
Durham, NH

Director: Godfrey H. Savage
Phone: (603)862-1356

University of New Hampshire
Water Resources Research Center
224 Science & Engineering Research Building
Durham, NH

Director: Thomas P. Ballestero
Phone: (603)862-2144

University of North Dakota
Devil's Lake Biological Station
Grand Forks, ND 58202

Director: Paul B. Kannowski
Phone: (701)777-2621

University of Notre Dame
Lobund Laboratory
Notre Dame, IN 46556

Director: Morris Pollard
Phone: (219)239-7564

University of Oklahoma
Cooperative Institute for Mesoscale Meteorological Studies
401 East Boyd
Norman, OK 73019

Director: Douglas K. Lily
Phone: (405)325-3041

University of Oklahoma
Environmental & Ground Water Institute
200 Felgar Street
Room 127
Norman, OK 73019

Director: Larry W. Canter
Phone: (405)325-5202

University of Rhode Island
Marine Geomechanics Laboratory
Narragansett Bay Campus
Narragansett, RI

Director: Armand J. Silva
Phone: (401)792-6194

University of Rhode Island
Water Resources Center
202 Bliss Hall
Kingston, RI

Director: Calvin P.G. Poon
Phone: (401)792-2297

University of Southern California
Institute of Safety and Systems Management
SSM-MC 0021
University Park
Los Angeles, CA 90089

Director: William J. Petak
Phone: (213)743-2411

University of Southern California
Lung Disease, Cancer, Lymphocytes and General Pathobiology Unit
2011 Zonal Avenue
HMR 201
Los Angeles, CA 90033
Director: Russell P. Sherwin
Phone: (213)224-7444

University of Tennessee, Knoxville
Water Resources Research Center
Knoxville, TN 37996
Director: E. William Colglaizer
Phone: (615)974-2151

University of Utah Research Institute
Environmental Studies Laboratory
391 Chipeta Way
Suite D
Salt Lake City, UT 84108
Director: A. Clyde Hill
Phone: (801)524-3463

University of Washington
Institute for Environmental Studies
Engineering Annex FM-12
Seattle, WA 98195
Director: Gordon Orians
Phone: (206)543-1812

University of Washington
Laboratory of Radiation Ecology
Fisheries Research Center
College of Fisheries
Seattle, WA 98195
Director: Professor Nevissi
Phone: (206)543-4259

University of Wisconsin, Madison
Department of Civil and Environmental Engineering
Sanitary Engineering Division
Madison, WI 53706
Director: P.M. Berthouex
Phone: (608)262-1776

University of Wisconsin, Madison
Environmental Toxicology Center
309 Infirmary
Madison, WI 53706
Director: Colin R. Jefcoate
Phone: (608)263-4580

University of Wisconsin, Madison
IES Center for Human Systems
1042 Wharf Building
Madison, WI 53705
Director: Marty S. Kanarek
Phone: (608)262-9937

University of Wisconsin, Madison
Sea Grant Advisory Systems
Walkway Mall
522 Bayshore Drive
Sister Bay, WI 54234
Director: Lynn Frederick
Phone: (414)854-5329

University of Wisconsin, Madison
State Laboratory of Hygiene, Enteric Bacteriology Unit
465 Henry Mall
Room 331
Madison, WI 53706
Director: Penny Wick
Phone: (608)263-3421

University of Wisconsin, Milwaukee
Center for Architecture and Urban Planning Research
P.O. Box 413
Milwaukee, WI 53201
Director: Gary T. Moore
Phone: (414)229-6165

University of Wyoming
Red Buttes Environmental Biology Laboratory
Box 3166
University Station
Laramie, WY 82071
Director: Harold Bergman
Phone: (307)745-8504

University of Wyoming
Wyoming Mining and Mineral Resources Research Institute
Box 3295
University Station
Laramie, WY 82071
Director: David O. Cooney
Phone: (307)766-6464

Utah Department of Natural Resources
Utah Geological and Mineral Survey
606 Black Hawk Way
Salt Lake City, UT 84108

Director: Genevieve Atwood
Phone: (801)581-6831

Utah State University
Center for Atmospheric and Space Sciences
Logan, UT 84322 4405

Director: Robert W. Schunk
Phone: (801)750-2961

Utah State University
Institute for Land Rehabilitation
College of Natural Resources
UMC 523
Logan, UT 84322

Director: Christopher Call
Phone: (801)750-2547

Vanderbilt University
Center for Industrial Water Quality Management
Civil and Environmental Engineering Department
Box 6222, Station B
Nashville, TN 37235

Director: W. Wesley Eckenfelder
Phone: (615)322-2697

Virginia Polytechnic Institute and State University
Safety Projects Office
167 Whitemore
Blacksburg, VA 24061

Director: Dennis Price
Phone: (703)231-5635

Washington State University
Environmental Engineering Research Laboratory
141 Sloan
Pullman, WA 99164 2910

Director: Kenneth E. Hartz
Phone: (509)335-3175

Washington State University
Laboratory for Atmospheric Research
College of Engineering
Pullman, WA 99164

Director: Hal Westberg
Phone: (509)335-8546

Washington University
Center for Air Pollution Impact and Trend Analysis
Campus Box 1124
319 Urbauer
St. Louis, MO 63130

Director: Rudolf B. Husar
Phone: (314)889-6099

Waste Systems Institute of Michigan, Inc.
470 Market Street SW
Suite 100
Grand Rapids, MI 49503

Director: Jeffrey L. Dauphin
Phone: (616)451-8992

Water Pollution Control Federation
601 Wythe Street
Alexandria, VA 22314 1994

Director: Quincalee Brown
Phone: (703)684-2400

Water Resources Association of the Delaware River Basin
Box 867
Davis Road
Valley Forge, PA 19481

Director: Bruce E. Stewart
Phone: (215)783-0634

Western Carolina University
Center for Improving Mountain Living
Cullowhee, NC 28723

Director: F. Merton Cregger
Phone: (704)227-7492

Western Illinois University
Institute for Environmental Management
College of Arts and Sciences
Macomb, IL 61455

Director: Larry Jahn
Phone: (309)298-1266

Western Illinois University
Water Quality Laboratory
Department of Chemistry
Macomb, IL 61455

Director: Robert E. Neas
Phone: (309)298-1356

Western Michigan University
Science for Citizens Center
116 Moore Hall
Kalamazoo, MI 49008

Director: Donald J. Brown
Phone: (616)387-2721

Williams College
Center for Environmental Studies
Kellog House
Williamstown, MA

Director: Ben Labaree
Phone: (413)597-2346

World Resources Institute
1735 New York Avenue NW
Suite 400
Washington, DC 20006

Director: James Gustave Speth
Phone: (202)638-6300

Center Name Index

This index is an alphabetical list of the 114 cooperative university and industry environmental R&D centers, with the center name cross referenced to the university/industry name.

Center for Environmental Studies
Arizona State University
Tempe, AZ 85287

Center for Environmental Toxicology
Michigan State University
C-231 Holden Hall
East Lansing, MI 48824

Center for Environmental and Hazardous Materials Studies
Virginia Polytechnic Institute and State University
1020 Derring Hall
Blacksburg, VA 24061

Center for Hazardous Materials Research
Pittsburgh, University of
320 William Pitt Way
Pittsburgh, PA 15238

Center for Hazardous Waste Management
New York, State University of (Buffalo)
207 Jarvis Hall
Buffalo, NY 14260

Center for Hazardous Waste Management
Illinois Institute of Technology and Illinois Institute of Technology Research Institute
10 West 35th Street
Chicago, IL 60616

Center for Lake Erie Area Research (CLEAR)
Ohio State University
1541 Research Center
1314 Kinnear Road
Columbus, OH 43212

Center for Remote Sensing
Delaware, University of
College of Marine Studies
Newark, DE 19716

Center for Research in Water Resources
Texas, University of (Austin)
10100 Burnett Road
Austin, TX 78758

Center for Urban and Regional Studies
North Carolina, University of (Chapel Hill)
108 Battle Lane
Chapel Hill, NC 27514

Central Florida Research and Education Center
Florida, University of
Apoka Institute of Food and Agricultural Sciences
2700 East Celery Avenue
Sanford, FL 32771

Clean Energy Research Institute
Miami, University of
P.O. Box 248294
Coral Gables, FL 33124

Coastal Resources Center
Rhode Island, University of
Narragansett Bay Campus
Narragansett, RI 02882

Complex Systems Research Center
New Hampshire, University of
Science and Engineering Research Building
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Cooperative Institute for Research in Environmental Sciences
Colorado, University of (Boulder)
Campus Box 449
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Cooperative Institute for Research in the Atmosphere (CIRA)
Colorado State University
Foothills Campus
Fort Collins, CO 80523

Crocker Nuclear Laboratory
California, University of (Davis)
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Desert Research Institute
Nevada, University of
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Reno, NV 89506

Drinking Water Research Center
Florida International University
College of Engineering and Applied Sciences
University Park Campus
Miami, FL 33199

EPA Hazardous Substance Research Center (HSRC)
Kansas State University
Engineering Experiment Station
Durland Hall
Manhattan, KS 66506

EPA Research Center for Waste Minimization and Management
North Carolina State University
Department of Chemical Engineering
Raleigh, NC 27695

Ecology Center
Utah State University
Logan, UT 84322

Ecosystems Research Center
Cornell University
311 Corson Hall
Ithaca, NY 14853

Energy and Environmental Research Center
North Dakota, University of
Box 8213
University Station
Grand Forks, ND 58202

Energy, Environment and Resources Center
Tennessee, University of (Knoxville)
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Engineering Experiment Station
Arizona, University of
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Engineering Experiment Station
Kansas State University
Durland Hall
Manhattan, KS 66506

Engineering Research Center for Hazardous Substances Control
California, University of (Los Angeles)
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Environmental Health Sciences Center
Oregon State University
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Environmental Research Center
Nevada, University of (Las Vegas)
4505 Maryland Parkway
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Environmental Resources Research Institute
Pennsylvania State University
Land and Water Resource Building
University Park, PA 16802

Environmental Science and Technology Division, Economic Development Laboratory
Georgia Institute of Technology
Georgia Tech Research Institute
Atlanta, GA 30332

Environmental Studies Center
Lehigh University
Chandler-Ullman Building #17
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Environmental and Water Resources Engineering Division
Texas A&M University
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Colorado State University
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Forestry Sciences Laboratory
Arizona State University
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Geophysical Institute
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Arkansas, University of (Little Rock)
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Great Lakes and Mid-Atlantic EPA Hazardous Substance Research Center (HSRC)
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Gulf Coast Hazardous Substance Research Center
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Hawaii Undersea Research Laboratory (HURL)
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Hazardous Substance Management Research Center (HSMRC)
New Jersey Institute of Technology
138 Warren Street
Newark, NJ 07102

Hazardous Waste Research Center
Louisiana State University
3418 Ceba Building
Baton Rouge, LA 70803

Huntsman Environmental Research Center
Utah State University
Logan, UT 84322

Industrial Waste Elimination Research Center
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Miami University
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Institute of Water Research
Michigan State University
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East Lansing, MI 48823

International Center for Aquaculture
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Kenneth E. Johnson Research Center
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Marine Ecosystems Research Laboratory
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Sea Grant College Program
Texas A&M University
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State of Washington Water Research Center
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Pullman, WA 99164

Statewide Air Pollution Research Center
California, University of (Riverside)
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Supercomputer Computations Research Institute
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Western Region Hazardous Substance Research Center
Stanford University; Oregon State University
Department of Civil Engineering
Stanford University
Stanford, CA 94305

Wyoming Water Research Center
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Laramie, WY 82071

Geographic Index

This index lists the names and addresses of the 114 cooperative university and industry environmental R&D centers alphabetically by the name of the state and city in which they are located.

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Alaska, University of (Fairbanks)
Water Research Center
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Forestry Sciences Laboratory
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Arizona, University of
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Tucson, AZ 85721

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California, University of (Davis)
Crocker Nuclear Laboratory
Davis, CA 95616

California, University of
Lawrence Livermore National Laboratory
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Engineering Research Center for Hazardous Substances Control
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National Center for Intermedia Transport Research
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Los Angeles, CA 90024

San Jose State University
Moss Landing Marine Laboratories
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California, University of (Riverside, Davis, Berkeley)
Agricultural Experiment Station
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Sanitary Engineering & Environmental Health Research Laboratory
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California Water Resources Center
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Clean Energy Research Institute
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Nova University
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Center for Aquatic Plants
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Drinking Water Research Center
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University Park Campus
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Florida Institute of Oceanography (FIO)
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Florida State University
Center for Biomedical and Toxicological Research
Bellamy Building
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Florida State University
Supercomputer Computations Research Institute
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Environmental Science and Technology Division,
Economic Development Laboratory
Georgia Tech Research Institute
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Hawaii Undersea Research Laboratory (HURL)
Marine Sciences Building
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Honolulu, HI 96822

ILLINOIS

Illinois Institute of Technology and Illinois Institute of Technology Research Institute
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10 West 35th Street
Chicago, IL 60616

Illinois Institute of Technology
Industrial Waste Elimination Research Center
3201 South State Street
Chicago, IL 60616

Illinois, University of
Advanced Environmental Control Technology Research Center
3230 Newmark C.E. Lab
208 N. Romine Street
Urbana, IL 61801

Illinois, University of
Institute for Environmental Studies (IES)
1101 West Peabody
Urbana, IL 61801

IOWA

Iowa, University of
University Hygienic Laboratory
Oakdale Campus
Iowa City, IA 52242

KANSAS

Kansas State University
EPA Hazardous Substance Research Center (HSRC)
Engineering Experiment Station
Durland Hall
Manhattan, KS 66506

Kansas State University
Engineering Experiment Station
Durland Hall
Manhattan, KS 66506

LOUISIANA

Louisiana State University
Hazardous Waste Research Center
3418 Ceba Building
Baton Rouge, LA 70803

Louisiana Universities Marine Consortium
Marine Consortium
Chauvin, LA 70344

MARYLAND

Maryland, University of
Sea Grant College
1224 H.J. Patterson Hall
College Park, MD 20742

MASSACHUSETTS

Harvard University
Kresge Center for Environmental Health
665 Huntington Avenue
Boston, MA 2115

Massachusetts Institute of Technology
Center for Environmental Health Sciences
77 Massachusetts Avenue
Building E-18, Room 666
Cambridge, MA 2139

Massachusetts Institute of Technology
Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics
Room 48-311
Cambridge, MA 2139

MICHIGAN

Michigan, University of
Great Lakes and Mid-Atlantic EPA Hazardous Substance Research Center (HSRC)
Department of Civil Engineering
2340 G.G. Brown Building
Ann Arbor, MI 48109

Michigan, University of
Institute of Environmental and Industrial Health
School of Public Health
109 South Observatory, Room 1518
Ann Arbor, MI 48109

Michigan, University of
Michigan Sea Grant College Program
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Institute of Water Research
334 Natural Resources Building
East Lansing, MI 48823

Michigan State University
Pesticide Research Center
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NEW HAMPSHIRE

New Hampshire, University of
Complex Systems Research Center
Science and Engineering Research Building
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NEW JERSEY

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104 Doolittle Building
Busch Campus
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New Jersey Institute of Technology
Hazardous Substance Management Research Center (HSMRC)
138 Warren Street
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New Jersey Institute of Technology
Institute for Hazardous and Toxic Substance Management
Newark, NJ 07102

Princeton University
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Engineering Quadrangle
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New Mexico State University
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New York, State University of (Stony Brook)
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Ohio State University
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Ohio State University
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Oklahoma State University
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OREGON

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Pittsburgh, University of
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Rhode Island, University of
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Civil Engineering Department
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Texas A&M University
Sea Grant College Program
College Station, TX 77843

Texas A&M University
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The Huntsman Environmental Research Center
Utah State University
Logan, UT 84322

Utah State University
Utah Water Research Laboratory
Logan, UT 84322

Brigham Young University
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Virginia Polytechnic Institute and State University
Virginia Cooperative Fish and Wildlife Research Unit
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State of Washington Water Research Center
Pullman, WA 99164

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Personal Name Index

This index provides the name and address of the director of each of the 114 cooperative university and industry environmental R&D centers. In cases where the name of the director was unavailable, the name of a key individual was provided as a point of contact.

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Huntsville, AL 35899

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Center Hill Solid and Hazardous Waste Research Laboratory
5995 Center Hill Road
Cincinnati, OH 45224

Lamar University
Gulf Coast Hazardous Substance Research Center
P.O. Box 10613
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The Huntsman Environmental Research Center
Utah State University
Logan, UT 84322

Utah State University
Utah Water Research Laboratory
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Water Quality

Alaska, University of (Fairbanks)
Water Research Center
Fairbanks, AK 99775

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Center for Environmental Studies
Tempe, AZ 85287

Arizona State University
Forestry Sciences Laboratory
Tempe, AZ 85287

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International Center for Aquaculture
Department of Fisheries and Allied Aquaculture
Swingle Hall
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Auburn University
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Richmond, CA 94804

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National Center for Intermedia Transport Research
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California, University of (Riverside)
California Water Resources Center
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Riverside, CA 92501

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Marine Sciences Institute
Avery Point
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Consortium: Rice University, University of Oklahoma, Oklahoma State University
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Cornell University
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College of Marine Studies
Newark, DE 19716

Desert Research Institute
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St. Petersburg, FL 33701

Florida International University
Drinking Water Research Center
College of Engineering and Applied Sciences
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Florida State University
Supercomputer Computations Research Institute
400 Science Center Library
Tallahassee, FL 32306

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Center for Aquatic Plants
7922 N.W. 71st Street
Gainsville, FL 32646

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1101 West Peabody
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Iowa City, IA 52242

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EPA Hazardous Substance Research Center (HSRC)
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Baton Rouge, LA 70803

Louisiana Universities Marine Consortium
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Sea Grant College
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77 Massachusetts Avenue
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Cambridge, MA 02139

Massachusetts Institute of Technology
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Room 48-311
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Ohio State University
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003 Life Sciences East
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Oregon State University
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317 Weinger Hall
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Rhode Island, University of
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