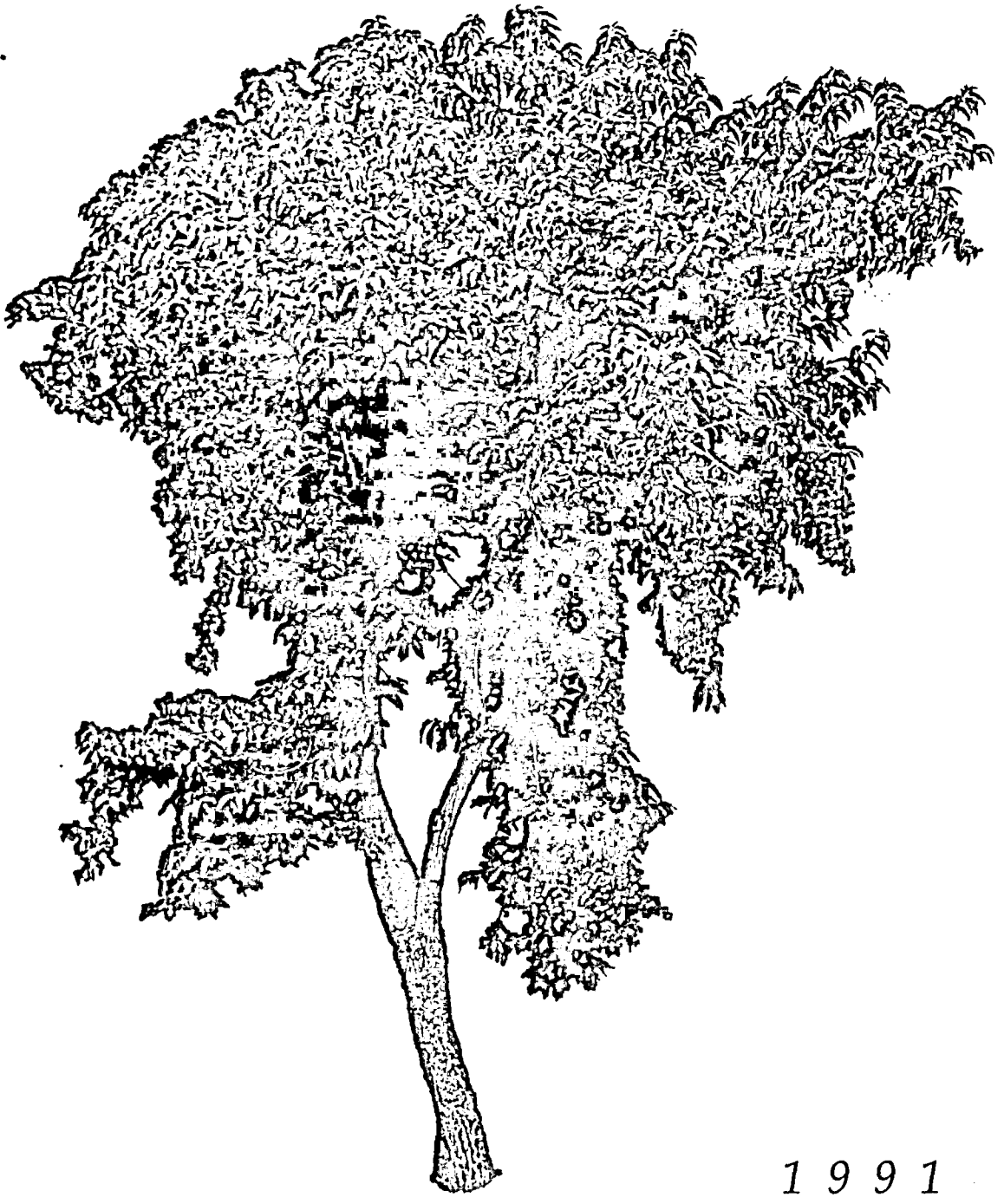


1990



Research Triangle Institute



Camptotheca acuminata.

Working under contract to the National Cancer Institute, RTI chemists isolated a chemical from this rare tree that was, in the early 1970s, a promising anti-cancer compound. But interest in the natural compound waned when it proved to be ineffective in the formulation in which it was administered. RTI's chemists persevered, however, and developed a class of synthetic compounds that exhibit a unique mechanism for inhibiting the growth of tumors. In 1990 Glaxo Inc. acquired worldwide development and marketing rights to the "camptothecin" compounds.

Research on medical care, as well as public health, environmental protection, and advanced technology, are some of the national scientific priorities to which RTI's technical staff responds with interdisciplinary research.

RTI was founded in 1958 as the initial scientific organization for North Carolina's Research Triangle Park.

The Institute now employs more than 1,400 people, with nationally recognized specialists in chemistry, life sciences, environmental sciences, social sciences, statistics, engineering, electronics and many more fields.

Under contract to governmental and industrial clients, RTI's staff conducts applied and fundamental research. In 1990, revenues from this research were \$100.2 million.

Cover photo courtesy of The Los Angeles State and County Arboretum.

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F. Thomas Wooten, President

The research and development agenda at RTI is driven by national priorities such as medical care, environmental protection, public health, and technology.

As those priorities change, the talents and entrepreneurial spirit of RTI's technical staff, combined with a strong core of scientific and support capabilities, equip the Institute to respond with energetic scientific programs.

This report highlights the diverse scientific abilities and accomplishments of these talented people.

F. Thomas Wooten

Scientific Priorities . . .

MEDICAL CARE RESEARCH

Chemistry, engineering, statistics, and life sciences all are involved in efforts by RTI staff to develop better ways to diagnose and treat diseases.

In the chemistry laboratory, and on the computer-aided drug-design system, RTI scientists create and test new compounds to treat cancer, to help people overcome clinical dependencies, and to fight off the effects of poisons. A nearly 30-year emphasis on natural products continues in a program for the National Cancer Institute to seek compounds in plant materials for cancer treatment.

Biomedical engineers apply electronics and mechanics to develop non-invasive techniques that describe heart and lung functions, to develop prostheses that restore hearing to some deaf people, and to deliver drugs in precisely controlled ways. A common element in these activities is the application of computer software to process large volumes of information and provide the most useful interpretation.

Clinical trials provide the opportunity for carefully controlled collection of data on how new diagnostics, prosthetics, and treatments affect human health. The RTI clinical trials program combines painstaking data collection and sophisticated statistical techniques to manage and report

multicenter studies on medical treatments and medical devices. Ongoing research focuses on antiviral and antibiotic treatments, heart and lung disorders and diagnostics, and prosthetic devices.



RTI staff helped apply NASA technology to create a burn analyzer, which can measure the depth of tissue damage in burn victims.

Clinical trials, chemistry projects and other endeavors help to improve health and health care.

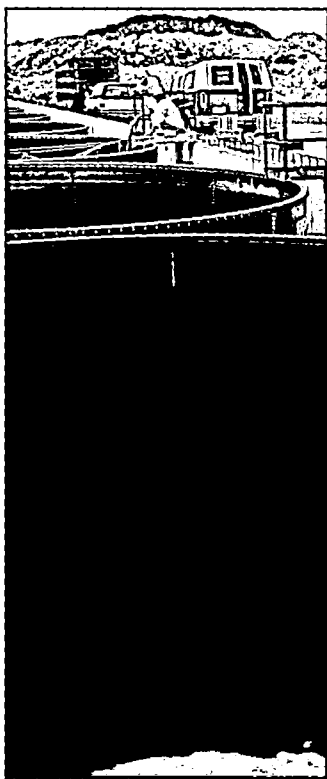
Life sciences contribute basic research to help understand biological systems, and also help test therapies as they emerge from the laboratory to determine whether they can be safely evaluated in human clinical trials. In basic studies, RTI is determining the biochemical

mechanisms of action of a variety of xenobiotic compounds, including drugs. In testing, RTI conducts pharmacology and metabolism studies, as well as toxicology research in cell cultures, bacterial cultures, and animals to determine the hazards present in pharmaceuticals and other chemical products.

ENVIRONMENTAL RESEARCH

Research at RTI to protect the environment focuses on air, water, and wastes. Scientists develop and apply methods to accurately measure ambient conditions, conduct biological research to characterize health effects of pollutants, develop technologies to reduce emissions and minimize wastes, and assess and recommend policies to cost-effectively control pollutants.

Those who make decisions on environmental protection rely on accurate measurements of the air, of water, and of hazardous waste. RTI develops field methods for reliable collection of specimens, laboratory methods for consistent analyses, and quality assurance programs to ensure accurate results. Applications of this work include ambient air, indoor air, personal exposure monitoring, surface and ground water, and hazardous wastes. →



*R*TI develops methods for reliable collection of specimens in the field. With experience in methods development, laboratory analyses, quality assurance programs, policy analyses and other capabilities, RTI assists a variety of agencies and industries in their efforts to protect the environment.

gases, and is exploring other new technologies to control emissions such as volatile organic compounds.

By combining risk information with knowledge of pollution control options, and with RTI's economic analysis of the costs and benefits of proposed pollution controls, Institute scientists compare the social, economic, and environmental impacts of various options. By pulling all these factors together, RTI presents federal, state, and corporate policy makers with the basis for sound decisions on protecting human health in the outdoor environment, at home, and in the workplace.

The critical pollutants to control are those that most threaten health, and the RTI toxicology, metabolism, and microbiology programs provide biological research to identify the most harmful chemicals in outdoor and indoor environments. RTI develops and applies methods to combine biological information with exposure data to assess the risk a given chemical poses to human health.

New technologies are required to control emissions that cause acid deposition and that cause adverse health effects. RTI has patented a process for removing sulfur from coal

PUBLIC HEALTH RESEARCH

AIDS, drug abuse, long-term care for the aged, care containment, education, sanitation — these public health issues reflect the commitment by RTI staff to research that enhances quality of life.

AIDS and drug abuse have become important areas, accounting for one-third of RTI scientific activity, and involving disciplines as diverse as applied statistics, sociology, psychology, economics, chemistry, pharmacology, and electronics.

AIDS research includes large epidemiologic studies in the US and abroad to track and characterize the epidemic's spread, coordination of clinical trials and studies of disease history, and chemical synthesis of experimental drug samples.

Drug abuse research includes development and evaluation of improved treatments, vast national surveys of drug use, an in-depth look at the drug problem in Washington, DC, biochemical research on how drugs affect body chemistry, and economic analyses of how drug abuse affects our society. The issues of AIDS and drug abuse overlap in research on how drug abuse prevention and treatment can be more effective in helping reduce the spread of AIDS via intravenous drug abuse.

Long-term care has emerged as an important focus for RTI social scientists, who conduct practical, applied research to develop means of improving the quality of care that seniors receive.

Meanwhile, in research on Medicare, Medicaid, and private insurance, other social and statistical scientists are evaluating the effectiveness of cost containment ideas and assessing the impact that such efforts have on the quality of care. →

As the population ages, long-term health care is becoming a concern for both policymakers and private citizens. Studies at RTI are investigating economic and social issues tied to this growing industry.

Institute staff are conducting research on many public health issues such as AIDS, drug abuse, disease prevention and sanitation.



Education can make important contributions to public health. RTI's research concerns drug-free schools programs and the effectiveness of school programs to help children with handicaps lead productive lives. Outside the classroom, RTI is determining the most effective public education tools (behavioral interventions) to help manage diabetes, prevent the spread of AIDS, and encourage people to stop smoking.

In developing nations, clean water supply and public sanitation represent profound needs in public health. RTI continues its long-standing role in the Water and Sanitation for Health program, sponsored by the US Agency for International Development. This issue, along with human resource development, economic development, public-sector management, and environmental protection, characterize RTI's activities in developing nations around the world.

TECHNOLOGY AND ENGINEERING

Engineers at RTI meet marketplace needs to develop technical advances, and to transfer knowledge and technology for real-world applications. They develop applications and processes for semiconductors, design electronic systems for aerospace, develop computer applications for reliability and information management, apply aerosol technology to control contamination, and invent new plastic materials.

To produce electronic devices in materials ranging from gallium arsenide to silicon to synthetic diamond, RTI's engineers are developing applications of vapor-phase epitaxial processes. Their focus is on optimum means to process these semiconductors, but they never lose sight of applications such as high-frequency transistors and photovoltaic cells.

Electrical engineers at RTI pursue practical applications of computer graphics, signal processing, and antenna and microwave technology to needs in civilian, scientific, and military aerospace programs. They develop cockpit displays for advanced aircraft, communications technology, and remote sensing systems.

While developing tools to optimize the hardware and software of new electronic systems, computer scientists at RTI recognize the need for highly reliable, highly efficient software. Human life depends upon the performance of computers in aviation, surface transportation, and medical care; industrial productivity depends upon software in automated manufacturing; and technological advance depends upon application of emerging methods such as neural networks.

Aerosol technology involves fundamental physical research on the behavior of fine particles in air and water. RTI applied research in this field involves indoor air quality, control of particulate emissions from industrial sources, protective clothing for toxic environments, and control of contamination in electronics manufacturing.

RTI addresses the need for plastics that meet not only performance, but also environmental, criteria. Composites that can withstand extreme temperatures, materials that biodegrade, and plastics tailored for sustained-release drug delivery are among the interests of scientists who apply a variety of sources and processes for polymers that meet specified marketplace needs.



In work for sponsors of the Surface Cleaning Technology Consortium, a staff member studies erosion during cleaning of aluminum disks in an ultrasonic tank. RTI established the consortium to develop surface cleaning and surface measurement methods for electronics manufacturing. This is in response to the need to develop new processes that do not use ozone-depleting

solvents and allow for the manufacture of advanced products with acceptable yields.

From semiconductors to plastics, RTI is working to meet marketplace needs and transfer knowledge for practical applications.



RTI Capabilities . . .

STATISTICAL SCIENCES

Dr. James R. Chromy, *Vice President*

Designs and conducts scientific sample surveys. Manages and statistically analyzes survey data and other scientific databases. Collaborates with other research units on surveys, statistics, mathematical modeling, and database management.

Research in Statistics

Survey Research

Computer Science

Ragland Computer Center

Center for Research in Statistics

Dr. Robert E. Mason, *Director*

Participates in interdisciplinary studies of issues in health and nutrition, the environment, education, energy, and national defense. Staff have developed statistical methodology and accompanying software to design and analyze complex probability-based surveys, and randomized experiments, as well as epidemiologic and toxicologic studies that are tailored to the question at hand.

Research Design Applications:

- Develops probability sampling procedures for making population inferences;
- Designs efficient, special-purpose samples of rare populations;
- Develops complex sample designs to achieve multiple precision constraints at minimal cost;
- Selects random-digit-dialing samples for computer-assisted telephone interviewing;
- Designs cohort, case-control, and cross-sectional epidemiologic studies.

Statistical Analysis Applications:

- Develops and implements robust sampling design-based estimation and analysis methodologies for complex surveys;
- Assesses nonresponse bias and applies compensation procedures;
- Develops small area estimation procedures;
- Analyzes epidemiologic data;
- Analyzes toxicity experiments;
- Conducts multivariate growth curve or profile analyses of longitudinal data;
- Develops response surface and geostatistical methods for ground water pollution.

Methods:

- Develops and conducts statistical training programs;
- Develops questionnaires using cognitive testing methods;
- Selects data collection modes;
- Develops probability sampling computer programs;
- Employs computer-accessible census data to select efficient national and subnational samples of specified populations;
- Develops sample-based estimation procedures for model parameters in linear and logistic regression and survival analysis (SUDAAN);
- Conducts laboratory studies of cognitive processes, recall errors, response to sensitive questions, and effects of interview mode.

Center for Survey Research

R. Paul Moore, *Director*

Conducts survey research for government and private sector clients, with primary responsibilities for survey design, data collection and data processing. Designs and manages mail, telephone and personal interview surveys, including computer-assisted surveys. Designs and supports software for data editing and cleaning, data base management, and analysis. Develops and administers special projects in survey methodology research.

Whether it's testing the feasibility of a national HIV seroprevalance study or finding out how far Americans drive to work, RTI can develop the scientific survey for the job.

Survey research is one of the cornerstones of Research Triangle Institute's work, and, over a 31-year period, the Institute has honed its

ability to find the right sample, survey that sample and produce quality data.

RTI has developed special skills in surveying hard-to-reach populations, such as the homeless, and has developed models that are used in national surveys.





RTI gathers data with a variety of methods, using whatever techniques are needed to collect accurate data in a cost-effective way.

Door-to-door data collectors often take along portable computers to speed collection and improve the accuracy of the sample. The Institute maintains a well-trained staff of telephone interviewers, who use computer-aided techniques that allow data to be collected from a nationwide or even worldwide sample.

Data collection is not always limited to answers to questionnaires. For some studies, RTI has collected samples of blood, body tissues and even breath.

Survey Design:

- Specifies cost-effective survey designs/methodologies
- Designs and develops questionnaires, forms, test instruments, training materials, and data collection procedures
- Conducts and evaluates pretests and pilot surveys;
- Designs and conducts research in survey methodology.

Field Surveys:

- Provides national field supervisory staff for sampling and interviewing to conduct national, regional, state, and local surveys;
- Administers household interviews, group-administered tests and questionnaires;
- Conducts computer-assisted personal interview surveys;
- Abstracts data from administrative and medical records;
- Collects environmental and biological specimens.

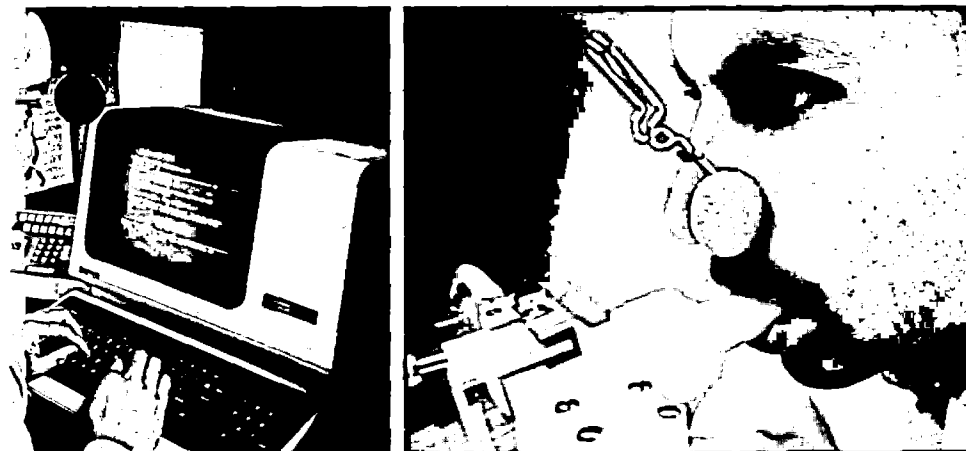
Telephone and Mail Surveys:

- Operates a telephone interviewing facility with national WATS service and on-line Computer-Assisted Telephone Interviewing;
- Obtains high response rates from mail surveys;
- Designs cost-effective surveys using combined data collection modes;
- Traces panel survey participants, including vital record searches.

Center for Computer Science

Robert H. Thornton, Director

Conducts research in software design, systems analysis, and computer applications. Supports data collection projects, particularly clinical trials studies and their coordinating centers and statistical centers. Staff disciplines include computer science, mathematics, statistics, and operations research.



Computer Modeling:

- Supports the development of models to assess policies of national and local concern;
- Develops software tools that support modeling production efforts;
- Develops simulation models to represent processes in the physical, engineering, and social sciences.

Database Management:

- Designs and implements project databases using both internal systems and commercial packages;
- Provides customized editing to ensure accuracy, consistency, and validity;
- Develops software tools that support database management and use.

Software Package Development:

- Developed and maintains FICS for control/monitoring systems and database development, maintenance, utilization, and documentation;
- Developed and maintains RTIPS (RTIFE plus RTIDE) for PC-based data keying;
- Developed and maintains software for polling of distributed data entry sites for automatic transfer of data to RTI;
- Supports the development and maintenance of software for survey data analysis (SUDAAN);
- Developed and maintains software to support medical coding and industry/occupation coding;
- Develops and maintains utilities, including data encryption routines.

Software:

- Supports a variety of software in the computer center and on PCs, including packages for programming, statistical analysis, database management, word processing, and spreadsheets;
- Offers training and user support for many of these packages, as well as for the operation of the computer center and PCs.

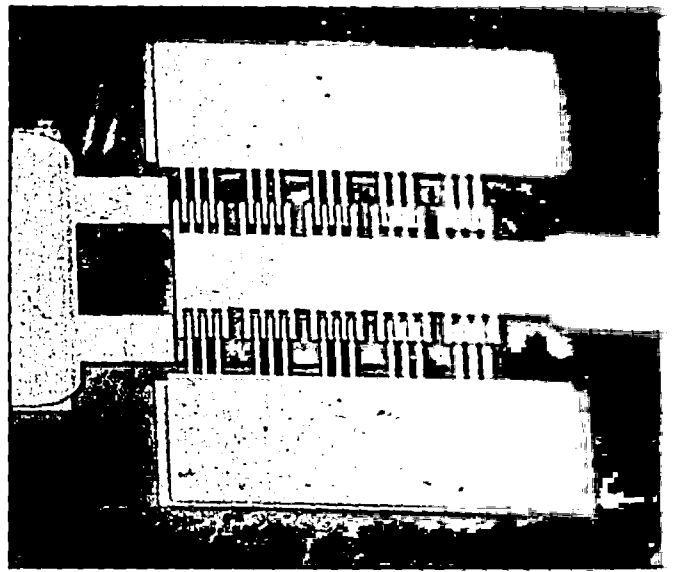
Data Communications:

- Provides users with access to a multitude of remote systems. Types of access include electronic mail, file transfer, remote login, and remote job submission;
- Remote systems include: other systems on the RTI campus; government institutions (EPA-NCC, NCHS, NIH, HCFA, others); universities nationwide (UNC, Duke, NC State, others); the North Carolina Supercomputing Center (Cray Y-MP); and international communication networks (Internet, Bitnet, Usenet).

Ragland Computer Center

James C. Wright, *Director*

RCC is a general purpose computing center for the Institute, and manages a campus-wide data communications network. RCC also provides a range of PC services, including maintenance, assembly, and integration with the computing center.



Engineers at RTI are developing new materials for microelectronic chips and new ways to make electronic devices.

In 1990, semiconductor researchers demonstrated a diamond electronic device, making RTI one of the first to have planar device technology in synthetic diamond film.

ELECTRONICS AND SYSTEMS

James B. Clary, *Vice President*

Develops and applies electronic, software, and systems technologies for aerospace, medical, commercial, and manufacturing organizations. Technical areas include semiconductor materials and devices, ultra-reliable and high-performance computer systems, computer graphics, communications, industrial automation, medical technologies, software engineering and knowledge-based systems.

• Semiconductor Research

• Digital Systems Research

• Systems Engineering

• Technology Applications

• Biomedical Engineering

• Neuroscience

Center for Semiconductor Research

Dr. James A. Hutchby, *Director*

Conducts basic and applied research on electronic materials and fabrication technologies; studies radiation hardness of electronic devices; and develops manufacturing cost/price models.

Semiconductor Materials and Processes:

- Develops remote plasma-enhanced chemical vapor deposition (RPECVD) microelectronics fabrication technology for full-stacked-gate silicon transistor technologies, epitaxial growth of semiconductor layers, epitaxial growth of diamond semiconductor materials, and insulator technology for passivation of III-V devices.

Organo-metallic Chemical Vapor Deposition:

- Develops organo-metallic vapor phase epitaxial (OMVPE) growth of III-V semiconductors;
- Grows thin layers of III-V materials with abrupt composition changes for solar cells, transistors, and optoelectronics;
- Develops methods to improve purity of III-V materials;

- Develops doping sources for OMVPE processes;
- Develops OMVPE techniques for chalcopyrite semiconductors.

Microelectronic Devices:

- Designs and produces prototype devices;
- Develops Si devices based on new integrated processes;
- Designs and analyzes III-V devices such as cascade solar cells and heterojunction bipolar transistors;
- Develops devices in new materials, such as diamond.

Radiation Hardness:

- Performs research and testing to support design of microelectronics with radiation hardness;
- Conducts basic research to characterize interaction of radiation with microcircuits.

Manufacturing Cost/Price Analysis:

- Develops and applies interactive software to describe, simulate, and optimize manufacturing of multiple products in a single facility.

Center for Digital Systems Research

Janet R. Dunham, *Director*

Develops theoretical concepts, performs systems analysis and systems engineering, designs and develops very large-scale integrated (VLSI) circuits and microelectronic systems, performs software engineering, conducts verification and validation, and models cost and effectiveness.

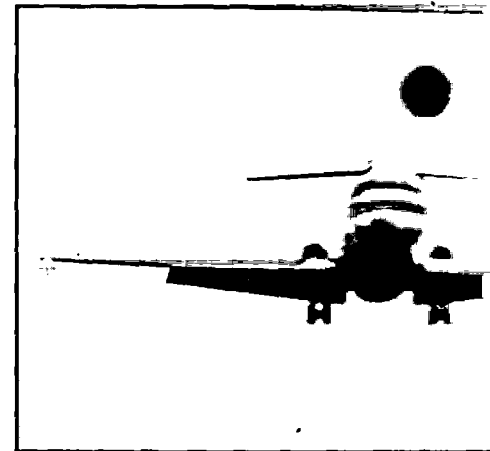
VLSI Systems and Circuits:

- Prototype chip and systems testing;
- Integrated circuits in both NMOS and CMOS;
- Full custom chips, standard-cell chips, and ASIC circuits;
- Chips and systems for industrial products/processes.

Researchers in electronics and systems are developing hardware and software for many applications, including aerospace, national security, medical, commercial and manufacturing.

Computers used to guide the takeoff and landings of airplanes must pass stringent testing and verification and validation processes.

Electronics and systems research staff work on systems development, using hardware and software for parallel processing with applications in weather pattern recognition and digital avionics. Their work also includes development of distributed real-time computing, which has aerospace and national security applications.



Fault-Tolerant Systems:

- Fault-tolerant integrated avionic systems;
- Reliability validation and fault-tolerance behavior modeling;
- Self-testing and self-repairing VLSI chips and systems;
- Validation methodology.

Digital Signal Processing:

- Analytical models and computer simulations of architectures for high-throughput radar, sonar, and guidance systems;
- Signal processing for industrial and military systems;
- Electro-optical instrumentation and computer/image analysis methods for weapons testing;
- Adaptive, temporal, and spatial signal detection and estimation algorithms;
- Computer-aided tools for software/hardware co-design.

Software Engineering:

- Independent verification and validation;
- Software quality assessment;
- Architecture design and performance assessment;
- Software system verification for computer security.

Center for Systems Engineering

Dr. James G. Haidt, *Director*

Specializes in analysis, design, testing, and evaluation of aerospace and electronic systems. Offers skill and experience in modeling and simulation, algorithm development, experiment definition, feasibility and trade-off studies, risk assessment, software engineering, instrument design and fabrication, systems integration, experimental measurements, and documentation and training.

Computer Graphics:

- Real-time information display technology;
- Tools to design and develop graphics software;
- Simulation testbeds for experimental display systems.

Launch Safety and Risk Assessment:

- Launch hazards and launch-vehicle failure modes and effects;
- Public safety risks from commercial launches;
- Flight termination systems.

Antenna and Microwave Technology:

- Advanced compact-range measurement programs;
- Prediction tools for wave propagation and backscattering;
- Airborne weather radar systems.

Instrumentation:

- CAD tools for printed-circuit boards and integrated circuits;
- Microwave/millimeter-wave systems.

Sensor Signal Processing:

- Information extraction algorithms for imaging systems;
- Signal processing techniques for surveillance radar systems;
- Computer simulations for advanced sensor systems.

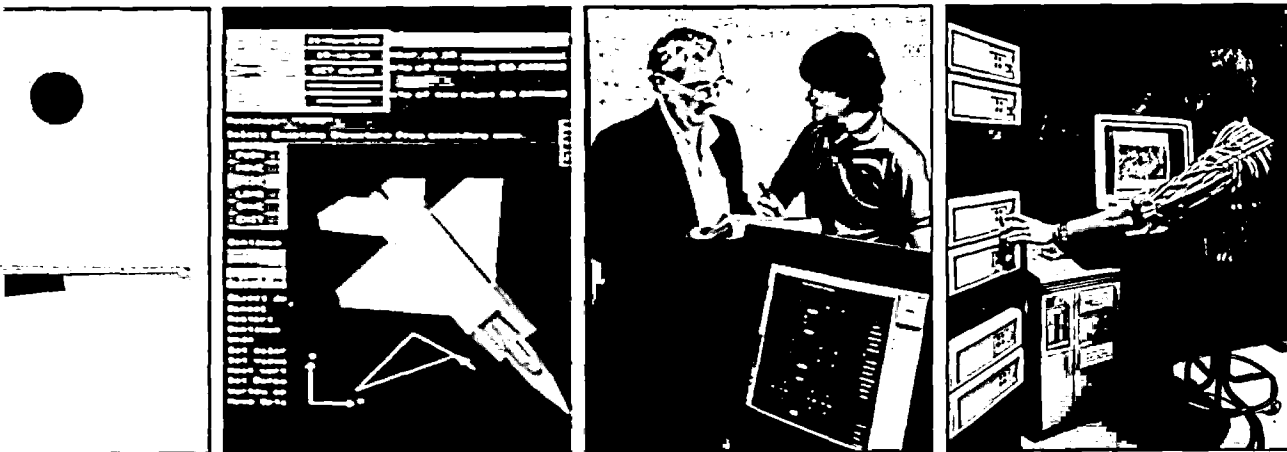
Center for Technology Applications

Dr. Doris J. Rouse, *Director*

Conducts interdisciplinary research, design and development to apply advanced technology to industrial processes, manufacturing, medical, and rehabilitation products.

Technology Transfer:

- Transfers technology from federal laboratories to the private sector;
- Identifies needs for technology, specifies requirements, identifies solutions, analyzes development cost/time, and develops strategies for government/industry collaboration;
- Manages a NASA Technology Applications Team for applications in industry, bioengineering, and rehabilitation;
- Evaluates product feasibility of medical devices.



Manufacturing Engineering:

- Models performance and throughput;
- Develops intelligent terminal networks for on-line transaction processing systems;
- Programs real-time multitasking software for transaction processing;
- Designs, fabricates, tests, and installs machines and systems;
- Provides stress analysis, thermal analysis, finite element analysis, vibration analysis, and computer modeling.

Biomedical Engineering Program

Dr. James N. Brown, Jr., *Acting Director*

Research in clinical and other human studies; development of devices for physiological measurement, clinical research and sensory aids; and analysis and modeling to interpret physiological and environmental data.

Clinical and Other Human Research:

- Noninvasive assessments of cardiac function in ambulatory subjects during transient cardiac ischemia;
- Noninvasive assessments of respiratory function in clinical and ambulatory settings;
- Models of relations between thoracic impedance measurements and cardiac performance.

Physiological Instrumentation:

- Laboratory, clinical and ambulatory devices for cardiac and respiratory measurements;
- Feature extraction and pattern recognition of physiological signals;
- Mathematical models of interactions between air flow and ultrasound.

Sensory Aids:

- Speech decoders for instruments for the hearing impaired;
- Unobtrusive wearable aids for low-vision disorders.

Neuroscience Program

Blake S. Wilson, *Senior Program Director*

Applies capabilities in neurobiology, neurophysiology, electrical engineering, and speech analysis.

Speech Processors:

- Designs and evaluates speech processors for cochlear and auditory brainstem implants;
- Develops processing strategies for hearing aids.

Neurophysiology:

- Develops neural and electric field models on intracochlear electrical stimulation;
- Evaluates model predictions with *in vivo* studies;
- Applies model results to the design of advanced speech processors.

Using modern and chemical synthesis and equipment, such as the newest nuclear magnetic resonance spectrometer, researchers are able to understand both the beneficial and harmful effects.

CHEMISTRY AND LIFE SCIENCES

Dr. C. Edgar Cook, *Vice President*

Designs, makes and assesses chemicals. Performs research in synthetic and bioorganic chemistry, metabolism, toxicology and polymers. Work includes pharmaceuticals, abused drugs, and agricultural, industrial and environmental chemicals.

Organic and Medicinal Chemistry

Life Sciences and Toxicology

Bioorganic Chemistry

Polymer Sciences

Center for Organic and Medicinal Chemistry

Dr. F. Ivy Carroll, *Director*

Conducts research on and develops pharmaceutical, agricultural and other chemical products.

Medicinal Chemistry:

- Research in chemical structure-biologic activity relationship;
- Computer-aided drug design and QSAR;
- Experience includes cancer chemotherapy, cancer prophylaxis, anticarcinogens, antiparasitics, contraceptives, radiation protectives, esterase mimics, narcotics and narcotic antagonists, stimulants, depressants, hallucinogens, cholinergics, anticholinergics, and antipsoriatic and antiacne agents.

Synthesis of Organic Compounds:

- Research in synthesis of organic compounds and development of improved synthetic methodology;
- Synthesis of drugs, metabolites, natural products, and synthetic compounds.

Synthesis of Isotopically Labeled Compounds

- Preparation of compounds labeled with carbon-14, carbon-13, tritium, deuterium, iodine-125, phosphorus-32, and sulfur-35
- Synthesis of high specific activity, specifically labeled uranium and iodine-125 compounds for radioimmunoassay and receptor studies.

Separation and Structural Analysis of Organic Compounds

- Application of coupled separations and spectroscopic techniques to analyze complex mixtures;
- Development of separation methodology, including use of adsorption, partition, exclusion, and ion exchange chromatography;
- High performance analytical and preparative chromatography;
- Nuclear magnetic resonance using hydrogen, deuterium, tritium, carbon-13, nitrogen-15, phosphorus-31, and other nuclei.

Center for Life Sciences and Toxicology

Dr. Frederick J. de Serres, *Director*

Designs and executes GLP research and testing protocols to support development of health care, industrial, and consumer products. Includes molecular, cellular, and genetic toxicology, mammalian genetics/mutagenesis, reproductive and developmental toxicology, endocrinology, *in vivo* toxicology/ oncogenicity.

Cellular and Genetic Toxicology:

- Ames/*Salmonella* mutagenicity assay;
- Induction of specific-locus mutations in *Neurospora crassa*;
- Cytogenetics analysis, including chromosome aberrations, Sister Chromatid Exchange assay, and micronucleus assay.

Mammalian Genetics/Mutagenesis:

- Dominant-lethal mutation assay and heritable translocation assay;
- Detection and molecular analyses of specific gene mutations.





The development of new pharmaceuticals, and other helpful compounds, requires a variety of tests and processes. Using computer-aided drug design, chemists can determine possible new molecular shapes that could improve a drug's effectiveness. With metabolism and toxicology studies, drugs are tested both for their physiological and possible detrimental effects. Analytical equipment, such as high performance liquid chromatography and mass spectrometry, is also used to track a drug or other compound's progress through a biological system.

- Mammalian cell transfection, baculovirus cloning, DNA sequencing, polymerase chain reactions, and protein engineering.

Reproductive and Developmental Toxicology:

- Developmental toxicity (teratology) studies, neurobehavioral testing, fertility and antifertility assays;
- FDA three-segment reproduction studies;
- FDA and EPA single- and multigeneration reproductive studies;
- National Toxicology Program Reproductive Assessment

Endocrinology:

- Contraceptive research and development;
- Design, quantification, and analysis of reproductive endocrine studies;
- Hormone/antihormone assays, hormone receptor assays, radioimmunoassays, and enzyme immunoassays.

In Vivo Toxicology/Oncogenicity:

- Acute, subchronic, and chronic toxicology studies;
- Carcinogenicity and chemopreventive studies;
- Histology/necropsy support services.

Center for Bioorganic Chemistry

Dr. A. Robert Jeffcoat, *Director*

Conducts molecular-level studies on the interactions between biological systems and chemicals such as pharmaceuticals, steroids, anti-cancer agents, environmental chemicals, pesticides/herbicides, personal care products, veterinary drugs, drugs of abuse, other xenobiotics, and industrial chemicals.

Pharmacology and Metabolism Studies

- Conducts metabolic disposition and pharmacokinetic studies;
- Develops methods for measuring xenobiotic concentrations in biofluids;



- Determines bioavailability and bioequivalence;
- Conducts dermal absorption studies of environmental chemicals;
- Studies inhalation of chemicals by nose-only exposure;
- Identifies, analyzes, synthesizes and tests metabolites.

Immunochemistry and Immunoassay Development:

- Synthesizes specific immunogens and labeled ligands;
- Produces antisera and monoclonal antibodies;
- Develops and validates immunoassays for therapeutic and abused drugs, pesticides, toxins, and other chemicals in biological materials;
- Develops catalytic antibodies for therapeutic and detoxification applications.

Specialty and Natural Products Chemistry:

- Tests therapeutic activity of natural products, steroid hormone analogs, and anti-cancer agents.

Research Support:

- Performs clinical chemistry on microsamples collected from humans and laboratory animals;
- Develops and confirms dosage formulations suitable for toxicity testing;
- Provides drug standards;
- Operates the NIDA certification program for drug testing laboratories;
- Prepares and analyzes research dosage forms.

Polymer Synthesis:

- Conducts free radical, ionic, emulsion, condensation, coordination synthesis, plasma polymerization, and solid state polymerization;
- Modifies polymers by grafting, glow discharge, and radiation processing;
- Synthesizes novel monomers;
- Liquid crystalline polymers - thermotropic and lyotropic;
- Elastomers, latex and specialty rubbers.

Polymer Applications:

- Controlled delivery of human and animal drugs;
- Environmental and biological polymer degradation;
- Porous and nonporous membranes for separation processes;
- Adsorbent materials;
- Polymer supports for catalysis;
- Polymer coatings;
- Heat-resistant polymers;
- Metal plating of polymers;
- Surface modified electrodes;
- Thin films for sensor applications and dielectrics.

Department of Polymer Sciences

Anthony L. Andrad, *Manager*

Specializes in polymer research and has broad capabilities in polymer synthesis, characterization, and application. Addresses both physical and chemical aspects of problems and applications involving polymers.



SOCIAL SCIENCES AND INTERNATIONAL DEVELOPMENT

Dr. Ronald W. Johnson, *Vice President*

Uses economic, sociological, demographic, and psychological methods to assess and recommend policies for governments and companies. Studies issues such as economic development, education, health care, mental illness, homelessness, alcohol and drug abuse, crime, public utilities, income security, and environmental protection.

Policy Studies

Social Research and Policy Analysis

Economics Research

International Development

Research in Education

- Analyzes human resource develops program needs and capabilities, and developments intervention strategies for public and private organizations;
- Conducts individual and organizational productivity assessment and improvement analysis.

Population and Family Studies:

- Conducts research on social, demographic, and economic determinants of change and variation in population and family events and circumstances, such as fertility, marital disruption, household structure, and infant mortality;
- Assists developing country planners to incorporate population and family health factors into development planning.

Center for Policy Studies

C. Lynn Usher, *Director*

Multidisciplinary staff with capabilities in demography, economics, human resource development, public policy analysis, public health administration, public management, sociology and statistics. Research experience and skills range from randomized experimental designs and multivariate analyses to more qualitative approaches, such as comparative case study designs and focus groups.

Public Policy Analysis and Program Evaluation Research:

- Provides research and technical assistance to public and private agencies in the US and abroad to design, implement, and evaluate policies and programs related to public health, human resources, agriculture, and public services;
- Provides research and technical assistance for public and private sector clients relating to health policy development, analysis and financing;
- Supports national, state, and developing country agencies, and private sector organizations, to link educational and training needs with employment needs;

Center for Social Research and Policy Analysis

J. Valley Rachal, *Director*

Conducts research on social and economic behavior of individuals, groups, and populations. Staff capabilities include sociology, social psychology, psychology, criminology, social policy analysis, statistics, economics, public administration, political science, and military issues and studies.

Alcohol and Drug Use and Abuse:

- Determines extent, nature, context, causes, and impacts of alcohol and drug abuse;
- Evaluates prevention, intervention, and treatment programs;
- Determines relationships between substance abuse and behaviors and conditions such as crime and employment;
- Develops information systems for policy, enforcement and treatment.

Drug abuse has become a modern pestilence. RTI researchers are attacking the problem from several fronts, supplying decision-makers with information about both the extent and effectiveness of current solutions to the problem.

Policy analysts and social researchers have examined different treatment programs, evaluating their

success and their cost-effectiveness. Chemists at RTI are at work on formulations for drugs to help addicts kick their habits. In a series of national surveys, RTI collects information from households about drug use and abuse. The information is used in the government's war on drugs.



Criminal Behavior:

- Determines extent, nature, and impacts of criminal activity;
- Studies the association of criminal behavior with behaviors or conditions such as employment and mental health status;
- Assesses the operations and effects of criminal justice system programs.

Mental Health:

- Determines incidence and prevalence of mental health problems;
- Examines need, availability, and use of mental health services;
- Studies the epidemiology and treatment of co-occurrence of alcohol and drug abuse and mental health problems.

Human Services and Human Resources:

- Develops and evaluates management practices for public services;
- Determines population and group-specific needs for human services;
- Studies military human resource issues.

Center for Economics Research

Dr. Allen K. Miedema, *Director*

Specializes in economic analysis of public and private policies for both government and business clients. Applies analytical methods such as benefit-cost analysis, microeconomic modeling, consumer behavior modeling, production and cost modeling, econometric modeling, non-market valuation techniques, and sample surveys.

Environmental Policy Economics:

- Evaluates environmental policies by projecting economic responses and changes in pollutant flows, estimating policy benefits and costs, and evaluating the distribution of benefits and costs.

Hazardous Waste Management Policy:

- Collects primary data to assess hazardous waste management and generation;
- Identifies and assesses alternative measures of pollution prevention and waste minimization.

Natural Resource Damage Assessment:

- Estimates value of environmental damages from accidents such as oil spills and chemical releases.

Health and Human Resource Economics:

- Evaluates the benefits, costs, and effectiveness of public and private efforts to improve public health and reduce accident risks.

Risk Management:

- Estimates human exposures to hazardous facilities and products, performs risk valuations, and evaluates alternative communication methods.

Energy Resource Planning:

- Provides energy research and planning services to public utilities for integrated resource planning, demand-side management, innovative pricing and service delivery, regulatory economics, rate design, load/use forecasting, and new business opportunities.

Market Assessment and Forecasting:

- Analyzes market potential and penetration for existing and new products and services;
- Evaluates the relationship between marketing actions and product adoption;
- Performs market segmentation analysis to identify submarkets.

One of the fastest growing areas of RTI's research work with international agencies for economic development, agricultural productivity, health care and other issues. Staff train representatives of client governments on the RTI campus and in the field in the use of computer models and other planning tools.

Center for International Development

Dr. Jerry VanSant, *Director*

Provides international research, technical assistance, and training to promote sustainable economic, technical, and social development and understanding. Delivers applied, policy-oriented services in economics, urban and regional development, health and family planning, education, demographics, human resource development, institutional development, information systems, public finance, and environmental policy and planning. Stresses action-oriented results to help increase the capacity of host-country institutions to develop and implement policies for equitable development.

Social Services and Human Resources Development:

- Research on determinants, consequences, and correlates of fertility, mortality, family planning, and migration;
- Population-based computer models and graphics;
- Demographic estimation and projection models;
- Community health and health finance;
- Water and sanitation for health;
- Educational planning and performance measurement.

Urban/Regional Finance and Management:

- Decentralization of public services;
- Urban services operations and maintenance;
- Urban economic development;
- Management and financing of public services;
- Privatization of urban services;
- Urban/rural economic linkages and market town development;
- Property tax administration and service cost recovery;
- Capital investment budgeting and financing.

Policy Support Systems:

- Policy analysis, implementation, and consensus building;
- Research institution development and management;
- Agricultural development policy and research;

- Environmental and natural resources policy;
- Gender issues in development policy;
- Microcomputer-based modeling and analysis.

Center for Research in Education

Dr. John A. Riccobono, *Director*

Conducts education research, program evaluation, policy analysis and development, and technical assistance. Staff capabilities and disciplines include: special education, adult higher education, vocational education, vocational rehabilitation, bilingual education, at-risk students and dropouts, education equity/minorities, school administration and management, and health education.

Policy Studies and Evaluation of Education Programs:

- Evaluates programs and institutions for targeted student populations, teacher training, and curricula;
- Administers surveys of elementary and secondary schools, colleges and universities, agencies, industry, and targeted subpopulations;
- Assesses factors related to development or decline of institutions;
- Assesses federal, state, and local educational policy, fiscal and enrollment trends, and use of classroom technology.

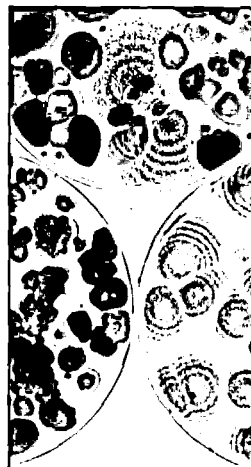
Institution and System Management:

- Develops information and long-range planning systems;
- Analyzes needs and audits local education programs;
- Assesses teacher evaluation programs;
- Provides technical assistance to program managers, administrators, and teachers.

Instructional Materials and Technologies:

- Develops and evaluates materials and technologies such as programmed instruction, computer/video applications, and instruction manuals.





ANALYTICAL AND CHEMICAL SCIENCES

Dr. Edo D. Pellizzari, Vice President

Develops fundamental chemical analysis techniques and applies them in research on pharmaceuticals, pollutants, toxicology and industrial processes.

Analytical and Chemical Sciences

Applied Analytical Systems

Analytical and Chemical Sciences

Dr. Linda S. Sheldon, Assistant Director

Develops and applies analytical techniques to determine trace organic and inorganic chemicals in biological, environmental, pharmaceutical, manufacturing, and energy-associated media.

Methods Development for Chemical Analysis:

- Develops, evaluates, and applies methods to analyze complex mixtures such as hazardous wastes, sludges, sediments, water, air, biological media, pharmaceuticals, industrial products, and biota;
- Identifies, quantifies, and performs structural analysis of parent compounds, metabolites and adducts, degradation products, and reaction by-products;
- Integrates measurements with toxicology, environmental science, and statistics.

Indoor Air Research:

- Develops methods to sample and analyze indoor air pollutants;
- Identifies and quantifies potentially hazardous compounds;
- Determines emissions of hazardous compounds from materials, furnishings, and equipment.

Human Exposure and Body Burden Monitoring:

- Measures environmental pollutants in air, water, food, tissue, breath, and biological fluids;
- Determines exposure, body-burden, and dosage



When you come into the building and your eyes start to burn and your throat gets scratchy, the old office joke is you're allergic to work. The truth is you may be allergic to the building you work in. A variety of studies under way at RTI test environments for pollutants and contaminants. RTI also has work focused on filter systems that clean the air and studies using personal monitoring devices.

relationships;

- Applies models for population exposure.

Vanguard Research Program:

- Develops new and novel analytical techniques based on state-of-the-art instrumentation.

Center for Applied Analytical Systems

● Charles M. Sparacino, *Director*

Develops and applies techniques to separate and analyze chemical and biological components at trace and preparative levels.

Pharmaceutical Research:

- Develops, validates, and applies methodology to analyze drugs, their degradation products and metabolites;
- Physically and chemically characterizes pharmaceutical components;
- Studies stability of drug materials, solutions, and dosage forms, and analyzes solid dosage forms for dissolution and disintegration.

Bioanalytical Research:

- Develops separation and assay schemes for peptides and other biopolymers;
- Develops scale-up procedures for purification of biological materials.

Environmental Research:

- Develops, validates, and applies methodology for chemical and biological analysis of airborne volatile organics;
- Applies pyrolysis/gas chromatographic analysis to characterize incinerated organics, polymers, and petroleum products;
- Applies dynamic purge and trap/GC to analyze water, sediments, soils, and other matrices;

- Applies standard and nonroutine extraction and chromatography techniques to analyze sediments, soils, wastes, and water.

Process Analysis:

- Develops, validates, and applies analytical methods to manufacturing process analysis for troubleshooting or optimization;
- Determines impurities in process streams or final products.

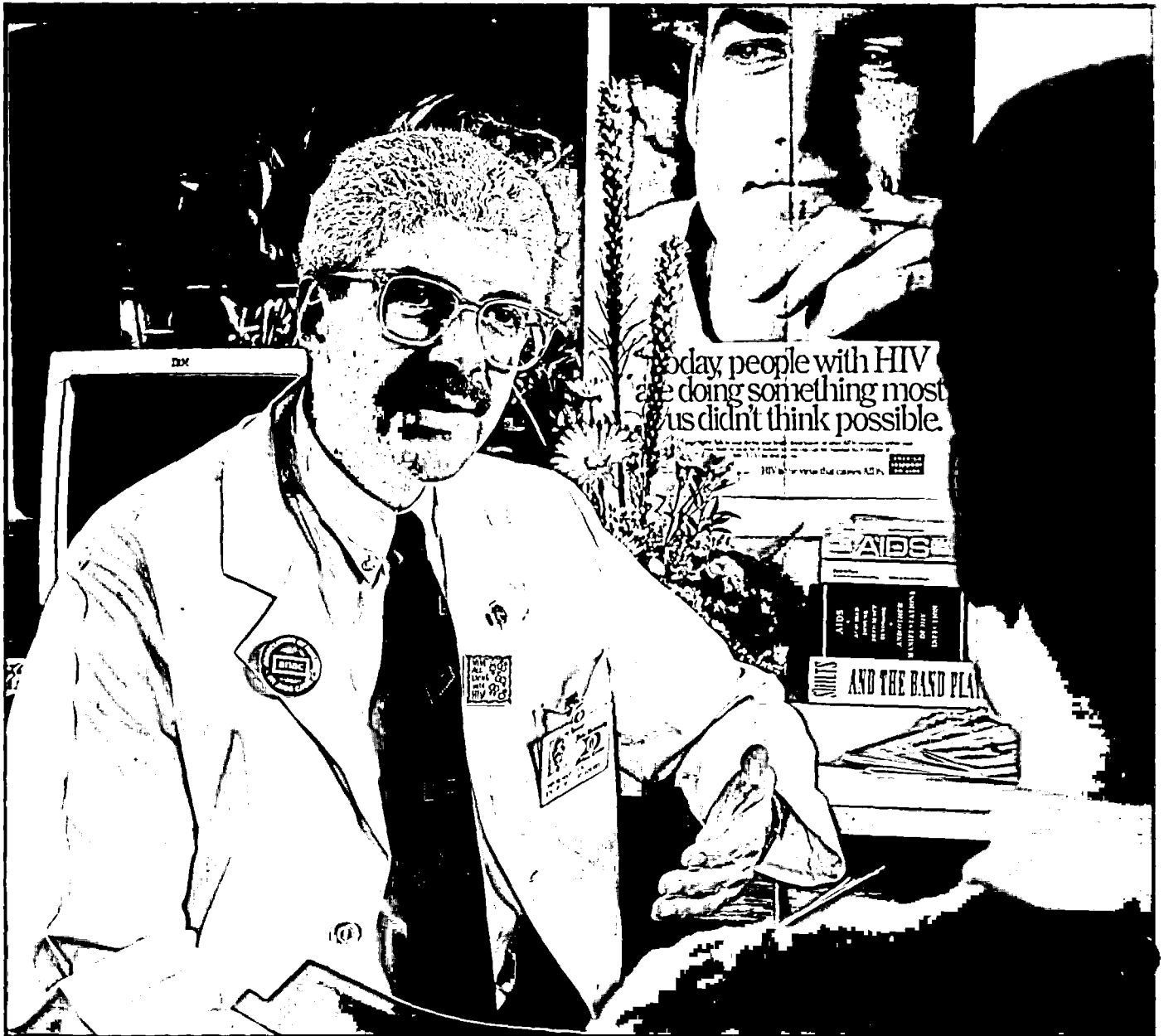
Health care is taking a larger and larger share of our take-home pay.

Naturally, methods of holding down costs are constantly under study.

Projects at RTI have focused on the effectiveness of behavior modification programs for smokers, diabetics and people who carry the AIDS virus.

For epidemiologic studies worldwide,

RTI collects blood samples and other data to determine rates of infection and track the natural history of diseases.





BIOMETRICS RESEARCH

Dr. W. Kenneth Poole, *Vice President*

Uses statistics and data management to produce information on health care, the environment, and energy management.

Conducts clinical trials of medical treatments and diagnostics, epidemiologic studies of diseases such as AIDS and cancer, surveys on pollution, and statistical analyses of energy use.

Medical, Environmental and Energy Statistics

Epidemiologic and Medical Studies

Center for Medical, Environmental and Energy Statistics

Dr. Tyler D. Hartwell, *Director*

Designs studies and analyzes data for investigations related to medicine, the environment, and energy. Capabilities include designing studies and analyzing data from a variety of statistical designs, experimental designs, biostatistics, mathematics, computer programming, and health education.

Clinical Trials and Natural History Studies:

- Serves as statistical coordinating center for multicenter clinical studies. Designs trials, data collection, quality control, and randomization procedures; collects and analyzes data; prepares reports of findings.

Health Education/Disease Prevention:

- Develops methods to evaluate wellness and preventive care programs;
- Designs and implements community interventions for smoking cessation.

Environmental Studies:

- Designs data collection and statistical analysis procedures to study exposure and body burdens of environmental agents;
- Develops experimental designs and statistical methodology to test and evaluate chemical methods.

Statistics and Data Management Software:

- Collaborates with RTI computer scientists to design software for efficient, cost-effective analysis of data from complex survey designs;
- Develops special-purpose software for statistical analysis and reporting.

Center for Epidemiologic and Medical Studies

Dr. Fred A. Bryan, Jr., *Director*

Coordinates and monitors multicenter clinical trials. Studies safety and efficacy of pharmaceutical products and medical devices. Performs epidemiologic studies of incidence, prevalence, distribution, and risk factors for diseases. Areas of experience include nursing, medicine, pathology, medical laboratory, regulatory monitoring of clinical and pharmacy operations, clinical data quality control and quality assessment, data collection, data management and processing, biostatistics, epidemiology, and survey research.

Epidemiologic Studies:

- Case-control, retrospective cohort, prospective cohort, and cross-sectional studies;
- Content areas include cardiovascular disease, cancer, reproduction, environmental exposures, nutritional effects, occupational health, and infectious diseases;
- Conducts research in the US and abroad.

Medical Studies:

- Coordinates multicenter clinical trials and performs bioavailability and bioequivalence studies of therapeutic drugs, other therapies, diagnostics, and medical instrumentation.



ENVIRONMENTAL SCIENCES AND ENGINEERING

James B. Tommerdahl, *Vice President*

Develops technical information, regulatory strategies, and new technologies to solve environmental problems. Works on environmental measurements, quality assurance of environmental data, waste minimization and treatment, risk assessments, geosciences, aerosol and contaminant technology and chemical engineering.

Environmental Measurements and Quality Assurance

Environmental Analysis

Aerosol Technology

Process Research

Center for Environmental Measurements and Quality Assurance

Clifford E. Decker, *Director*

Develops, evaluates, and applies methods to analyze and conduct field measurements of ambient air, indoor air, source emissions, hazardous wastes, and industrial hygiene pollutants. Provides technical quality assurance (QA) support in the development, implementation, and evaluation of data quality objectives, QA project and program plans, technical systems audits, performance evaluation audits, data quality audits, methods development and evaluation, and management systems review.

Chemical Analysis/Methods Development:

- Analyzes multimedia environmental pollutants (air, water, soil, hazardous waste);
- Develops and evaluates methods to sample and analyze organic and inorganic pollutants in multimedia environments;
- Develops, evaluates and applies solid, liquid, and gaseous reference materials for laboratory performance audits.

Hydrogeological Studies:

- Characterizes area and site-specific hydrogeology;
- Characterizes extent/dynamics of ground water contamination and develops remedial-measure alternatives;
- Provides spatial data analysis and modeling.

Acid Deposition:

- Conducts laboratory and field determinations of acid rain;
- Develops and evaluates monitoring devices and measurement methods.

Environmental and Occupational Health:

- Conducts industrial hygiene surveys and provides health assessments and industrial hygiene and occupational health sample analysis;
- Performs air sampling and literature research to support indoor monitoring.

Air Quality:

- Performs field measurement studies and monitors ambient, indoor, and captive air for criteria pollutants and other parameters;
- Field tests monitors, collectors, and measurement methods.

Asbestos and Radon Programs:

- Develops methods for sampling and analysis of bulk and airborne asbestos;
- Standardizes methods to identify and quantify asbestos materials by optical microscopy, x-ray diffraction, and analytical electron microscopy;
- Conducts performance audits for radon through the EPA National Radon Measurement Proficiency Program, and for asbestos through the American Industrial Hygiene Association, the National Institute for Standards and Technology, and the Navy Environmental Health Center.

Water is such a part of our daily lives we often don't consider that it might contain compounds harmful to our health. RTI has a broad range of capabilities in environmental testing, monitoring and measurement. Sophisticated computer programs allow for mapping based on a number of sources of information.

Chemists here analyze both wildlife and water samples for pollutants, and researchers help the EPA, state governments and companies produce important reports on the environment and policies for its protection.

Quality Planning for Research and Monitoring:

- Develops QA procedures for ambient air, stationary source emissions, acid deposition, indoor air quality, hazardous and solid waste, health effects research, and water and pesticides programs;
- Provides technical support and develops data quality objectives (DQOs) for research and monitoring projects.

Center for Environmental Analysis

Dr. Dennis F. Naugle, Director

Conducts engineering and scientific analyses for government agencies and private-sector companies to provide the basis for decisions on air and water quality control, water resource management, and waste management. Conducts basic and applied research in biochemical processes, risk reduction strategies, risk analysis of environmental pollutants, and atmospheric computer modeling.

Engineering and Regulatory Assessment:

- Air emission control technology assessment;
- Control strategy evaluation and compliance studies.

Atmospheric Sciences:

- Satellite data processing for global climate change models;
- Emission/dispersion models for environmental pollutants.

Hazardous Waste and Toxic Release Studies:

- Standards development and regulatory impact assessment;
- RCRA permitting support;
- Toxic emission inventories.

Environmental Biochemical Research:

- Laboratory and bench-scale studies of chemical and biological treatment methods for soils, wastewater, and airborne contaminants;
- Biohazard monitoring of indoor air, medical wastes, and other media.

Environmental Assessment:

- Environmental impact analysis and public health assessment;
- Toxicity database development.

Environmental Risk Analysis:

- Human health and environmental risk characterization;
- Engineering and management controls to reduce health risks.

Water Quality Management:

- Modeling and wasteload allocation;
- Database development and data analysis;
- Water quality planning.

Water Resources Planning and Management:

- Simulation and optimization modeling;
- Demand forecasting and drought management.

Center for Aerosol Technology

Dr. David S. Ensor, Director

Conducts basic and applied research in aerosol science, with emphasis on clean room, indoor air quality, environmental, and defense applications. Capabilities include research and development in aerosol generation and detection, particle filtration theory, filter testing, mathematical modeling of aerosol behavior, electrostatics, electrohydrodynamics, and enhanced filtration.

Clean Engineering:

- Determines origin and ultimate fate of aerosols in clean rooms;
- Characterizes gas- and liquid-borne contamination;
- Organized the Surface Cleaning Technology Consortium, a collaborative program to develop surface cleaning technologies and evaluate alternatives to CFCs.

Studies of Aerosol Behavior:

- Studies fundamental properties of aerosols, including light-scattering, coagulation, transport, and impaction;
- Studies physical and chemical properties of single particles;
- Calibrates aerosol instruments in chambers and wind tunnels.

Contaminant Control Technology:

- Electrostatically augmented industrial fabric filtration;
- Improved electrostatic precipitator designs;
- Develops laboratory, bench-scale, and pilot-scale test programs;
- Aerosol penetration and deposition testing of protective clothing;
- Conducts filter testing using improved, nonstandard tests to assess performance under actual use conditions;
- Measures efficiency of air cleaners;
- Measures particle and gaseous emissions from equipment and processes.

Mathematical Modeling:

- Develops screen-oriented user-friendly microcomputer models for indoor air quality and environmental applications;
- Develops cost/performance models for particle control technology;
- Develops effective models of smoke plume opacity and visibility.

Center for Process Research

Dr. James J. Spivey, Director

Conducts fundamental chemical engineering studies and mathematical modeling of heterogeneous reactions, gas/solid equilibria, engineering processes, adsorption/reaction processes surface science, and multicomponent fluid-solid diffusion/reaction processes.

Catalyst Research:

- Develops and characterizes catalysts for hydrogenation, dehydrogenation, oxidation, sulfur recovery, hydrocarbon conversion, and fuel production;
- Develops kinetic models and performs bench- and pilot-scale research.

Adsorption:

- Develops fundamental understanding of the adsorption of gaseous and liquid species on solid sorbents;
- Conducts experimental evaluations of kinetic and thermodynamic properties of sorbents for separations and trace species recovery.

Materials Development:

- Develops improved materials for gas-solid adsorption, gas-solid reaction, catalytic processes, and high-pressure/high-temperature separation/reaction of gaseous species;
- Characterizes chemical and physical properties of solid catalysts and adsorbents.

Process Engineering and Evaluation:

- Develops models of chemical reactions and separation processes;
- Conducts laboratory studies to evaluate the feasibility of environmental control processes;
- Develops and evaluates technical alternatives and determines costs of new processes and modifications.

*R*TI's scientific staff, and its capabilities, continue to expand to meet changing research needs. The Institute's breadth allows it to respond to needs in a variety of research fields.

Construction will begin this year on a new chemistry building, which should be ready in 1993. Also remodeling of existing facilities (page 32) will enhance research capabilities.

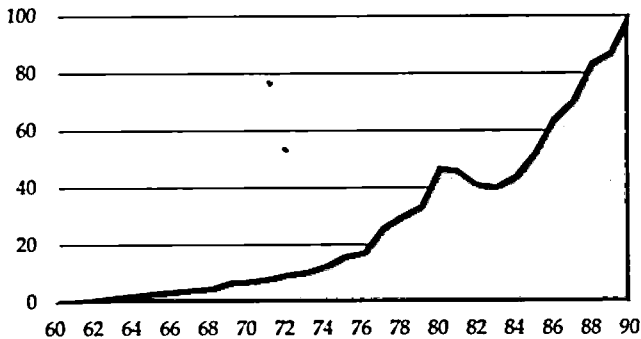




90 Operating Highlights

Research Revenue

Millions of Dollars



RTI's revenue rose in 1990 to a record \$100.2 million, an annual increase of 13.5%.

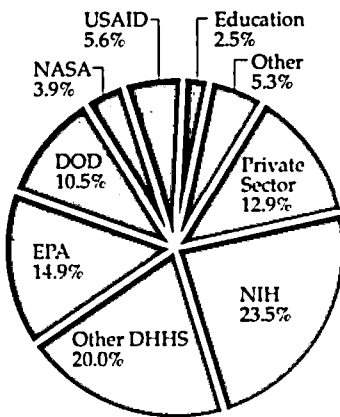
Project labor costs, a more direct measure of research activity, rose 10% for onsite operations and 25.9% for offsite. Continued strength is expected because new contract funding in 1990 reached \$118.6 million, a substantial increase over the previous fiscal year.

regulations, and about half is motivated by product and process development. This fact, and the healthy diversity of the private-sector client base, means further growth can be expected in this important business segment.

Support from the Department of Defense declined to 10.5% of revenue. However, DOD will continue to be one of RTI's most important clients because many of its research interests match RTI's capabilities in electronics, environmental, and social science research.

During 1990, the regular staff grew from 1,359 to 1,409. Offices in the District of Columbia, Virginia, Florida, and overseas continued to expand and now employ more than 100 people.

Sources of Revenue



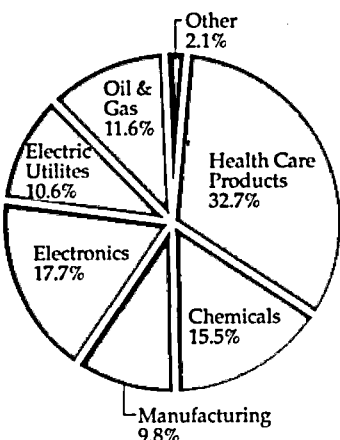
RTI's diversity of clients is indicated by the distribution of sources of revenue. (see chart).

The US Department of Health and Human Services accounted for 44.4% of revenue, an exceptional increase from 25.8% only three years ago. More than half of RTI's work for this department is for the National Institutes of Health as RTI responds to public health and medical care issues such as AIDS, long-term care, and healthy lifestyles. Another important factor has been social science, applied statistics, and chemistry research related to drug abuse.

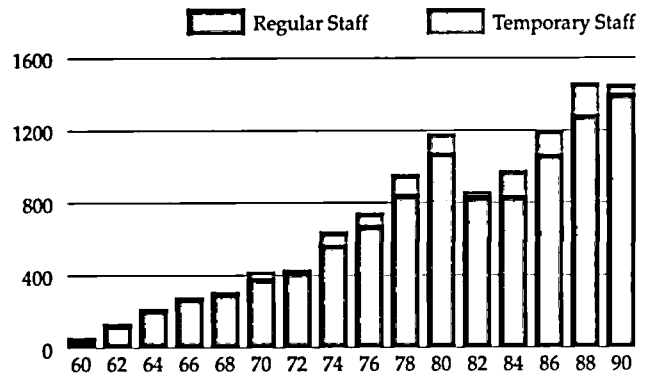
The Environmental Protection Agency remains one of RTI's largest sources of revenue, accounting for 14.9% of the Institute's activity in 1990. RTI's interest in environmental issues is long-standing, and this commitment is expected to continue.

The private sector accounted for 12.9% of revenue, up from 10.1% last year. About half of RTI's work for these clients is motivated by their needs to comply with government

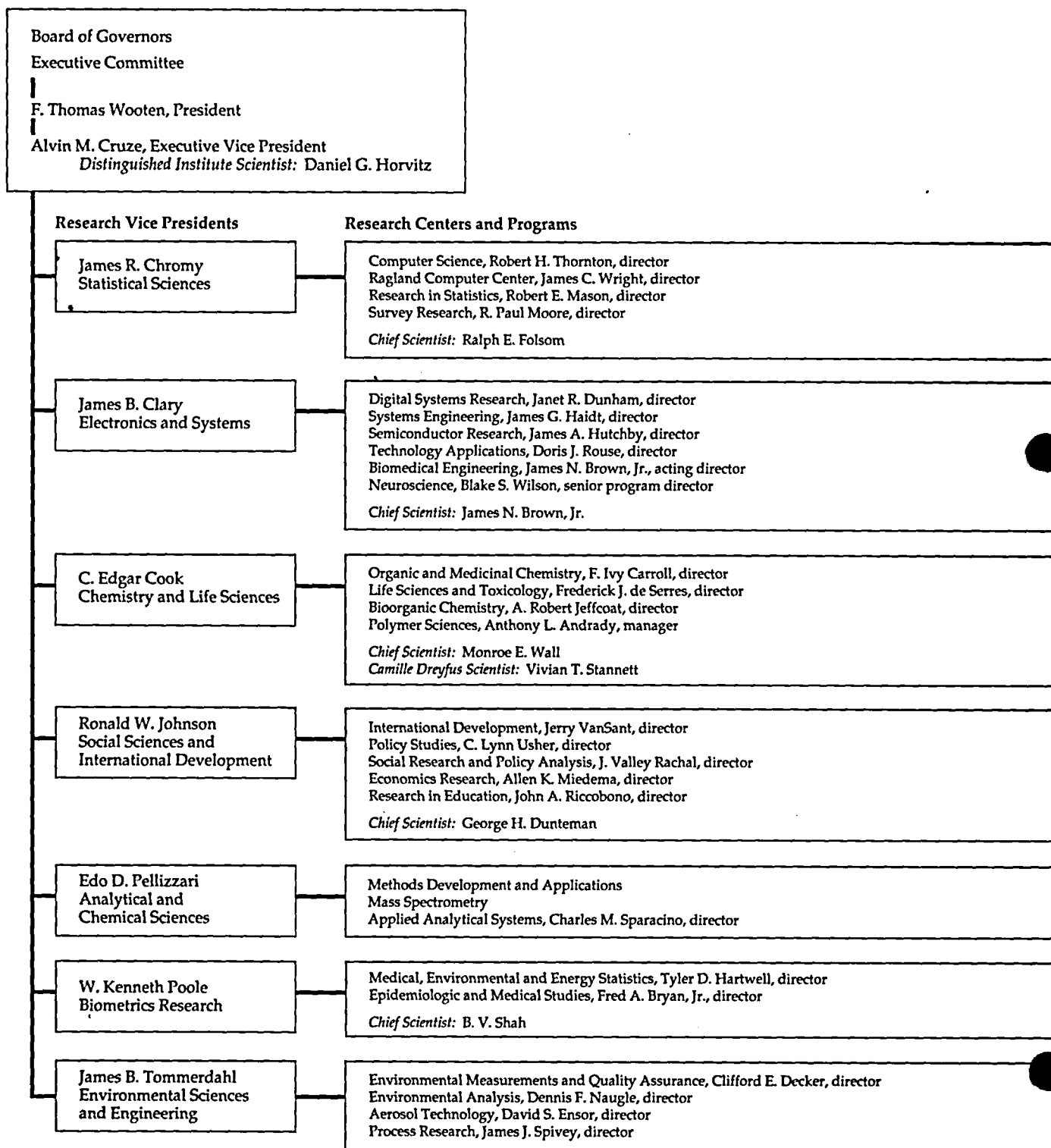
Private Sector Revenue



Staff Growth



Research Organization



Governance and Corporate Officers

Board of Governors

Of the 30 Governors: five hold seats by virtue of their positions: the presidents of The University of North Carolina, Duke University, and the Research Triangle Institute, and the chancellors of NC State University and the University of North Carolina at Chapel Hill; three are specified in the By-Laws: George Watts Hill, William C. Friday, and George R. Herbert; nine are appointed annually to represent Duke University, The University of North Carolina general administration, NC State University, and UNC-Chapel Hill; up to 15 Governors are elected from the business and professional communities. A separate category of Lifetime Governor recognizes retired Board members who have made extraordinary contributions to the progress and welfare of RTI. Robert T. Armstrong is the current Lifetime Governor.

Chairman:

George Watts Hill,* Chairman of the Board, Central Carolina Bank and Trust Company, Durham

Vice Chairman:

George R. Herbert,* President Emeritus, Research Triangle Institute

Executive Committee Chairman:

Marcus E. Hobbs,* University Distinguished Service Professor Emeritus of Chemistry, Duke University

John C. Bailar, III, Professor, Epidemiology & Biostatistics, McGill University

Erich Bloch, Washington, DC

H. Keith H. Brodie, President, Duke University

Ivie L. Clayton, Business Consultant, Raleigh

Pedro Cuatrecasas, Vice President and President, Pharmaceutical Research Division, Warner-Lambert Co.

Donald H. Dawson,* Senior Vice President and President for Academic Affairs, The University of North Carolina

William C. Friday, President, William R. Kenan, Jr. Fund, Chapel Hill

Steve C. Griffith, Jr., Senior Vice President and General Counsel, Duke Power Company, Charlotte

Phillip A. Griffiths,* Provost, Duke University

Paul Hardin, Chancellor, University of North Carolina at Chapel Hill

Margaret T. Harper,* President, The Stevens Agency, Southport

Franklin D. Hart,* Interim Provost and Vice Chancellor, North Carolina State University

William G. Howard, Jr., Senior Fellow, National Academy of Engineering

Earl Johnson, Jr.,* President, Southern Industrial Constructors, Inc., Raleigh

William L. Klarman,* Interim Vice Chancellor for Research, North Carolina State University

Matthew Kuhn, President, MCNC, Research Triangle Park

William F. Little,* University Distinguished Professor of Chemistry, University of North Carolina at Chapel Hill

Eugene J. McDonald, Executive Vice President - Asset Management, Duke University

Larry K. Monteith, Chancellor, North Carolina State University

J. Dennis O'Connor,* Vice Chancellor for Academic Affairs and Provost, University of North Carolina at Chapel Hill

Charles E. Putman, Executive Vice President for Administration, Duke University

Thomas A. Rose, President, Blue Cross and Blue Shield of North Carolina, Durham

C. D. Spangler, Jr., President, The University of North Carolina

Thomas J. Troup, Vice Chairman, Burr-Brown Corporation, Tucson, Arizona

Charles B. Wade, Jr., Winston-Salem

F. Thomas Wooten,* President, Research Triangle Institute

Phail Wynn, Jr., President, Durham Technical Community College

*Member, Executive Committee

Members of the Corporation

The Members are the equivalent of RTI shareholders. As such, they elect the Governors who represent the business and professional communities. Of the nine Members of the Corporation: four are the chairmen and presidents of The University of North Carolina and Duke University; one is George Watts Hill, a lifetime Member of the Corporation; four are elected annually, two from and by the Duke University Board of Trustees, and two from and by the Board of Governors of The University of North Carolina.

Members of the Corporation representing Duke University are: H. Keith H. Brodie, Durham; Nathan T. Garrett, Durham; Fitzgerald S. Hudson, Charlotte; Thad B. Wester, Raleigh

Members of the Corporation representing The University of North Carolina are: Samuel H. Poole, Raleigh; T. Henry Redding, Asheboro; Hon. Robert W. Scott, Haw River; C.D. Spangler, Jr., Chapel Hill

Corporate Officers

RTI officers, including the research vice presidents listed on page 34, are elected by the Board of Governors.

F. Thomas Wooten, President

Alvin M. Cruze, Executive Vice President

William H. Perkins, Jr., Financial Vice President

Suzanne P. Nash, Corporate Secretary

R.S. McLean, Treasurer

Carolyn J. Harris, Assistant Corporate Secretary

An Overview of RTI

Research Triangle Institute (RTI) is a not-for-profit contract research organization located in the center of North Carolina's Research Triangle Park. RTI was established in 1958 by the University of North Carolina at Chapel Hill, Duke University, and NC State University.

RTI conducts applied and basic research in the United States and abroad for clients in government, industry, and public service.

Organization and Staff

RTI's organization supports the formation of multidisciplinary teams to address complex research issues.

The staff of more than 1,400 includes approximately 60 percent professionally trained research personnel. Of these, nearly two-thirds have advanced degrees. Their backgrounds include more than 115 degree fields.

Major areas of training and experience include:

Social Sciences: economics, econometrics, benefit-cost analysis, evaluation research, urban and regional planning, international development, health services and health policy research, agricultural development, sociology, psychology, social psychology, education, business administration, public administration, municipal financial management, criminology, law, political science, and the humanities.

Survey Research: sample design and selection, survey planning and execution, data collection and management, and research and development on survey methodology.

Mathematics, Statistics, and Computer Sciences: data management and analysis, statistical methods development, statistical analysis, biostatistics, clinical trials, epidemiology, computer-aided engineering, CAD/CAM, systems software, software verification, computer security, numerical modeling, and operations research.

Environmental Sciences and Engineering: environmental controls and engineering, environmental chemistry, environmental health, industrial hygiene, hazardous materials management, hydrogeological and earth and mineral sciences, meteorology, and oceanography.

Chemical and Biological Sciences: analytical, organic, inorganic, physical, polymer, and medicinal chemistry; toxicology, pharmacology, genetics, neuroscience, biology, biochemistry, and microbiology.

Engineering and Physics: electrical, electronics, systems, computer, semiconductors, chemical, biochemical, energy, industrial, mechanical, manufacturing, materials, biomedical, aerosol, civil, petroleum, nuclear, aeronautical, and transportation engineering.

University Affiliations

RTI was created as the focal point for growth in North Carolina's Research Triangle Park, an industrial and governmental scientific center built around the resources of the area's three major research universities.

RTI's capabilities are greatly expanded by frequent collaboration with university scientists. Additional relationships include joint staff appointments, cooperative research programs, and other professional contacts.

Laboratory and Office Facilities

RTI's Research Triangle Park campus includes 430,000 square feet of laboratory, computer, and related facilities for all RTI programs. RTI also maintains research offices in Washington, DC; Newport News, VA; Cocoa Beach, FL; and at project locations in the US and abroad.

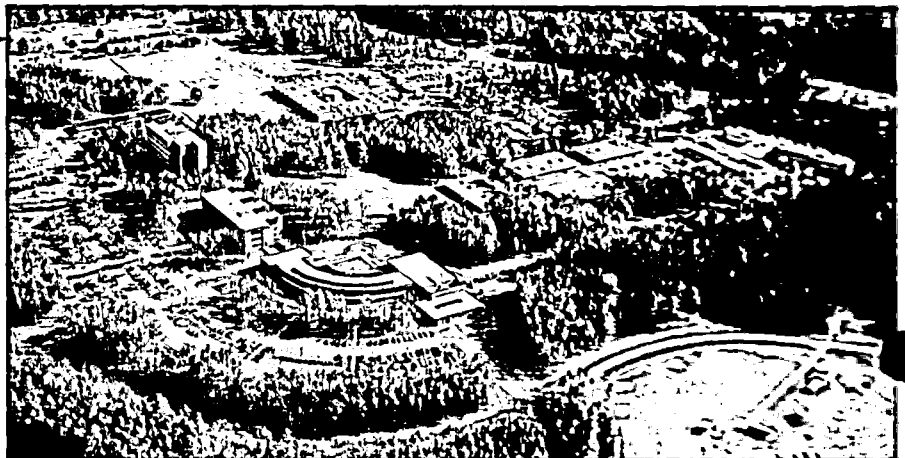
Computer Facilities

In-house facilities for data management, data modeling, simulation, software R&D, computer-aided engineering, electronics, and library management include microcomputers, two computer centers, and daily traffic with national and regional scientific networks.

Library Facilities

The RTI Technical Information Center provides on-line computerized literature searches for data bases relevant to RTI research programs. The Center maintains subscriptions to more than 1,000 professional periodicals. Specialized libraries are maintained in RTI research buildings.

RTI staff have full access to the combined libraries of the nearby universities, which have been cross-cataloged and shared since 1972. Access is facilitated by computerized ordering, bus, and daily truck service.



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Address correction requested



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Fax 919-541-5985