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OAK RIDGE NATIONAL LABORATORY

LOCKHEED MARTIN

Life Sciences Division Progress Report

For CYs 1997–1998

June 1999

Life Sciences
DIVISION
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LIFE SCIENCES DIVISION
PROGRESS REPORT FOR THE PERIOD
CYs 1997–1998

Reinhold C. Mann
Director

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OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
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LIFE SCIENCES DIVISION
PROGRESS REPORT FOR THE PERIOD
February 1, 1997 – December 31, 1998

LIFE SCIENCES DIVISION
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(continued)

Foreword

This is the first formal progress report issued by the ORNL Life Sciences Division. It covers the period from February 1997 through December 1998, which has been critical in the formation of our new division. The legacy of 50 years of excellence in biological research at ORNL has been an important driver for everyone in the division to do their part so that this new research division can realize the potential it has to make seminal contributions to the life sciences for years to come.

This reporting period is characterized by intense assessment and planning efforts. They included thorough scrutiny of our strengths and weaknesses, analyses of our situation with respect to comparative research organizations, and identification of major thrust areas leading to core research efforts that take advantage of our special facilities and expertise.

Our goal is to develop significant research and development (R&D) programs in selected important areas to which we can make significant contributions by combining our distinctive expertise and resources in the biological sciences with those in the physical, engineering, and computational sciences. Significant facilities in mouse genomics, mass spectrometry, neutron science, bioanalytical technologies, and high performance computing are critical to the success of our programs.

Research and development efforts in the division are organized in six sections. These cluster into two broad areas of R&D: systems biology and technology applications. The systems biology part of the division encompasses our core biological research programs. It includes the Mammalian Genetics and Development Section, the Biochemistry and Biophysics Section, and the Computational Biosciences Section. The technology applications part of the division encompasses the Assessment Technology Section, the Environmental Technology Section, and the Toxicology and Risk Analysis Section. These sections are the stewards of the division's core competencies. The common mission of the division is to advance science and technology to understand complex biological systems and their relationship with human health and the environment.

Major thrust areas in the division include functional genomics and proteomics, biomedical technology research, bioanalytical science and technology, computational biology and bioinformatics, toxicology and risk analysis, life cycle analysis, and environmental assessment and remediation. Core programs are in place in functional genomics and in computational biology/bioinformatics. We will build on these programs to develop a strong proteomics effort. Closely related to this thrust is a proposal for a new Center for Structural Molecular Biology (CSMB) that was developed during this reporting period and is undergoing review during the Summer of 1999. The proposed CSMB would be a user facility that would provide access to a new small angle neutron scattering station at the ORNL High Flux Isotope Reactor (HFIR), to the special biological mass spectrometry facility at the Laboratory, and to

our computational biology resources. With increased support for biomedical engineering both at the National Institutes of Health (NIH) and at the Department of Energy Office of Biological and Environmental Research (DOE-OBER), our ongoing projects in this area are being positioned to establish another core research program in the division. Our alliance with the ORNL Instrumentation and Controls (I&C) Division, and record of accomplishments coming from this partnership contribute significantly to our competitiveness in biomedical engineering. In addition we have been forming a partnership with the Biomedical Engineering Department at Vanderbilt University. We are strengthening program development efforts in the toxicology and risk analysis, life cycle analysis, environmental assessment and remediation areas through the Technology Applications Program in the division.

This report describes many technical highlights produced by the researchers in our division. A number of our scientists were recognized by significant honors and awards. A few examples include the election into the National Academy of Sciences of Dr. Audrey Stevens in 1998. Biological research at ORNL has been recognized since 1957 by the election of six researchers to the National Academy of Sciences (Alexander Hollaender, 1957; William Arnold, 1962; William Russell, 1973; Richard Setlow, 1973; Liane Russell, 1986, Audrey Stevens, 1998). Dr. F. F. (Russ) Knapp, leader of our nuclear medicine program, achieved the rank of Corporate Fellow, the highest distinction for scientists at ORNL. John Miller, head of the Biochemistry and Biophysics Section, was elected Fellow of the American Association for the Advancement of Science. Richard Leggett was elected to the National Council on Radiation Protection and Measurements. Annetta Watson accepted an invitation to serve on the U.S. Army Science Board.

A few personnel changes had impact on programs in the division. Richard Woychik, who was instrumental in launching the ORNL functional genomics initiative, took a position at Case Western Reserve University in 1997, and moved from there to Parke-Davis Pharmaceutical in 1998. Monica Justice accepted an offer from Baylor College of Medicine in 1998. Lisa Stubbs left the Laboratory to join Lawrence Livermore National Laboratory. Eugene Rinchik accepted the leadership position for our mouse mutagenesis program and joined the division in 1998. Yun You moved from Jackson Lab to join our mouse genomics program. DOE funding for our fundamental and applied cryobiology effort was significantly reduced and some of it reoriented in scope and direction. As a result, Peter Mazur, Corporate Fellow, and founder and leader of the program retired from the Laboratory and established his research laboratory at the University of Tennessee. Similarly, DOE funding for the protein engineering group was terminated. Fred Hartman, Director of the former Biology Division, Corporate Fellow, and founder and leader of this program, retired from the Laboratory and established a research laboratory at The University of Tennessee (UT). Charmaine Foltz joined the Laboratory as Institutional Veterinarian. In the division, she heads the Laboratory Animal Resources Section, which operates the Mouse Genetics Research Facility, a DOE user facility with a current average daily occupancy of 70,000 mice. At the end of this reporting period, Michelle Buchanan,

leader of the biological mass spectrometry laboratory in the Chemical and Analytical Sciences Division (CASD) joined our division as Associate Director with special focus on providing leadership to our functional genomics program and on building our core efforts in proteomics and structural biology.

During this reporting period, we initiated a number of partnerships that are becoming more and more important for the future of our research programs. The Joint Institute for Biological Sciences (JIBS) was established between ORNL and UT to promote and develop support for collaborative education and research in biological sciences. UT organizations involved in this effort include the Medical Complex, the College of Veterinary Medicine, and the Institute of Agriculture. Barry Berven, Associate Director of our division, was named acting director of JIBS in September 1998. Work is under way to develop a strategic plan outlining specific goals for R&D, staffing, facilities and equipment, and funding. As part of JIBS, the UT/ORNL Graduate Program for Biomedical Sciences has been restructured into the Graduate Program for Genome Science and Technology. This program has been realigned under Life Sciences at both UT and ORNL to have greater involvement and relevance to research initiatives and educational needs at both institutions.

An April 1998 conference, "Partnering for Functional Genomics Research," attracted representatives from 14 pharmaceutical and biotechnology companies. All participating companies expressed interest in further interactions, and several new projects are being discussed. The Merck Genome Research Institute initiated a research project through JIBS. Other follow-on activities are under way to establish collaborative efforts and to pursue the development of an R&D consortium involving several industry partners.

On December 3, 1998, ORNL signed a memorandum of cooperation with a number of medical institutions in Tennessee. Participants include the University of Tennessee (Knoxville and Memphis), Meharry Medical College, Vanderbilt University Medical Center, and St. Jude Children's Research Hospital. This partnership, called the Tennessee Mouse Genome Consortium, is designed to facilitate collaborations among the participating institutions, using the ORNL Mouse Genetics Research Facility (MGRF) as a resource and partner in the research programs under the consortium umbrella.

We have been investing considerable effort into moving research labs out of obsolete facilities at the Y-12 site to the main ORNL campus. At the end of this reporting period only some 60 employees remain at the Y-12 site. These are researchers and staff whose work is associated with the MGRF. Groundbreaking for a new $2.8-million laboratory building at the ORNL site is occurring as this report is being finalized. A $12-million construction line item project, the Laboratory for Comparative and Functional Genomics (LCFG), is being planned for fiscal year 2001. The LCFG will be a modern animal facility that will house our mouse colony, rederived from frozen sperm and embryos, in a specific pathogen-free environment. Upon completion of these two construction projects, we will be able to close down the life sciences complex at Y-12. The LCFG is the first item of a planned $38-million investment by

DOE-OBER into a Center for Biological Sciences (CBS) at ORNL. The CBS is planned as a modular complex of buildings, equipment, and infrastructure that will house current and future research programs in the areas of functional genomics, structural biology, proteomics, and systems biology. It will provide the environment for the ORNL biological research program to make significant contributions to biology during the next decade and beyond, with a special focus on complex biological systems research. Development of the CBS will enhance the advantages gained from the program's recent restructuring to embrace not only the biological sciences but also allied disciplines in information science and computing, analytical methodologies, and chemistry.

Life Sciences Division

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Overview

The Life Sciences Division was created in February 1997 by merging the Biology and Health Sciences Research Divisions. It continues the ORNL tradition of excellence in biomedical research that started 50 years ago. Building on strong and often unique competencies and special facilities in Mammalian Genetics, Molecular Biology, Biochemistry and Biophysics, Structural Biology, Bioinformatics, Biomedical Technology, Biotechnology, Environmental Assessment Technologies, Risk Analysis, and Toxicology, the division pursues research and development to understand the impact of energy production and use on biological systems in general and on human health in particular. The division provides a stimulating R&D environment for a multi-disciplinary group of approximately 480 staff members, including researchers, support staff, subcontractors, guests, and students who pursue challenging research at the intersection of the Biological, Physical, Medical, Engineering, and Computational Sciences. The division operates the MGRF, an official Department of Energy User Facility. It consists of a colony of approximately 500 genetic strains of mice with a total of approximately 70,000 animals, and co-located well equipped laboratory space. This mutant collection is a resource for research in analyzing gene function and identifying mouse models of human genetic diseases. The division has modern experimental research laboratories that support research in the core biosciences and technology development in biosensing, molecular imaging, and high-throughput genotyping. State-of-the-art computing and information processing facilities are part of the division infrastructure supporting Bioinformatics and Computational Biology research programs.

Mission

The mission of the Life Sciences Division is to advance science and technology in order to understand complex biological systems and their relationship with human health and the environment.

Structure

The Life Sciences Division consists of six research sections, an operations support section, and the Laboratory Animal Resources Section, which operates the MGRF.

Systems Biology

Biochemistry and Biophysics Section

Computational Biosciences Section

Mammalian Genetics and Development Section

Biochemistry and Biophysics Section

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Introduction

Activities in the Biochemistry and Biophysics Section span the fields of biology, chemistry, and physics with particular emphasis on the science at the intersection of these fields; e.g., biochemistry, biophysics, and chemical physics. Basic research is carried out in areas such as protein engineering, establishment of structure-function relationships, x-ray and neutron crystallography of biomolecules, DNA structure, biosensors, disease diagnosis, health effects from chemicals and radiation, plasma physics, microscopy, and optical and mass spectrometry. In addition to the basic research, considerable effort is spent on technology development such as the invention and refinement of novel measurement techniques, instruments, and sensors. Some technologies of recent interest include laser spectroscopy, mass spectrometry, scanning probe microscopies, imaging technology, and biosensors. A recent emphasis has been on potentially high throughput chip technologies and multiplexed sensors. Wireless biomedical devices, developed in collaboration with the I&C Division, represent another important focus for the future.

Biochemistry research focuses on exploration of structure and function relationships of animal and plant proteins. The proteins studies include energy-related enzymes, growth factors important in cancer biology, and DNA repair enzymes. Site-directed mutagenesis, biochemical modification, and genetic techniques are used to produce modified proteins. Extensive studies on the regulation of eukrayotic messenger RNA synthesis and turnover has focused on several exoribonucleases. These enzymes play an important role in regulating RNA levels and function. ORNL has extensive national-resource capabilities for structural biology in neutron scattering and diffraction at the HFIR. The x-ray counterparts of these facilities provide synergistic and complementary structural capabilities. These facilities are being used to determine the structural organization of genomic DNA and associated nuclear proteins through detailed three-dimensional analysis of structures such as the nucleosome core particle. The molecular immunology program focuses on ligands that bind to cell surface molecules to target isotopes to cellular sites. Glycoproteins in the endothelium of tumors are the subject of study of monoclonal antibodies. These target molecules are identified using protein chemistry and molecular biology.

Selected Accomplishments

Flowthrough Genosensor Technology. A high-throughput DNA analysis system based on flowthrough genosensor technology was assembled by researchers in BABS. This system has the ability to monitor thousands of DNA sequences simultaneously, at high speed, due to the unique micro-capillary array design. The flowthrough genosensor chip is comprised of DNA probes attached to the inner walls of micro-capillaries connecting the two faces of a glass or silicon wafer. Robotic technologies for the automated gridding of DNA probes across the genosensor chips have been developed. When a labeled

nucleic acid sample is flowed through the chip, the pattern of binding across the chip, analyzed by a CCD imaging system, reveals the presence and relative abundance of specific nucleotide sequences in the sample. Flowthrough chip technology has been patented and licensed. Applications of the technology in genotyping, gene expression analysis, and microbial identification are under development. The technology is expected to help researchers uncover complicated cellular processes such as metabolic pathways and responses to genotoxic or pathogenic exposure and will facilitate diagnosis of genetic and infectious diseases, and accelerate drug discovery.

New Generation of Intelligent Sensors. The next revolution in microminiature electronic devices will be in the area of intelligent sensors. Exploiting the sensitivity of micromachined springboards used in the atomic force microscope, researchers have shown that a variety of physical, chemical, and biological components in the environment can be perceived at extremely small levels. Arrays of such sensors now combined on a single silicon chip provide a powerful and yet very inexpensive means for simultaneous measurement. Several companies have licensed or are in the process of licensing the cantilever technology, which is expected to impact areas of environmental monitoring, industrial control, and consumer products.

ORNL Technology Puts Knoxville Company in Remediation Fast Lane. Slow and expensive commercial laboratory tests of water or soil may become obsolete because of a new instrument developed by the Advanced Monitoring Development Group and licensed to Environmental Systems Corporation. The Knoxville company has purchased the commercial rights to the technology to be used in the Luminoscope, a field-portable instrument designed to detect, measure, and monitor levels of gasoline, oil, polychlorinated biphenyls (PCBs) and pesticides down to parts per million levels in soil or in water. The instrument fits inside a suitcase-size carrying case and has a battery pack. A laptop computer provides instrument control, data analysis, spectral display and data storage.

Surface-Enhanced Raman Gene Probe for HIV Detection. The Advanced Monitoring Development Group has reported for the first time the use of surface-enhanced Raman (SERS) active labels for primers used in polymerase chain reaction (PCR) of specific target DNA sequences. This method has the potential for combining the spectral selectivity and high sensivitity of the SERS technique with the inherent molecular specificity offered by DNA sequence hybridization. The effectiveness of the detection scheme is demonstrated using the *gag* gene sequence of the human immunodeficiency virus (HIV). The SERS gene probe technology, which can make use of multiple probes for simultaneous detection of multiple biological targets, is currently developed for improved DNA mapping using BAC close methods.

Antibody-Based Nanosensor for Single-Cell Measurement. Optical sensors with nanoscale dimensions are powerful tools that are capable of providing selective identification of biochemical compounds at

ultra-trace levels in biological systems. Research staff in the Advanced Monitoring Development Group have recently developed an antibody-based nanosensor for measurement of benzo(a)pyrene tetrol (BPT), a metabolite of the carcinogen benzo(a)pyrene inside a single cell. The antibody has recognition/binding sites for specific molecular structures of the antigen and "fit" the unique antigen such that hollows, protrusions, planes, and ridges of the antigen and antibody are complementary. One can then develop antibodies to recognize molecular structures of chemicals, biochemicals, and microorganism components. The inherent selectivity of these antibodies can be utilized as specific "detectors" to identify many analytes of interest that are present at ultra-trace levels in single cells for studying gene expression or for medical diagnostics. Combining the exquisite specificity of biological recognition probes (antibodies) and the excellent sensitivity of laser-based optical detection, optical biosensors are capable of detecting and differentiating bio-chemical constituents of complex systems in order to provide unambiguous identification of a variety of diseases.

Monoclonal Antibodies Developed in Life Sciences Laboratory. The integrins are a family of cell-surface proteins involved in cell attachment. Researchers in the Molecular Immunology Group developed monoclonal antibodies (MAb) which recognize two members of the family and can be used to identify these proteins and their role in cellular functions. Although not patented, a bailment transfer mechanism was developed to "sell" the antibodies to companies so that they can be made available commercially. Three companies have acquired a total of four of these MAbs. In the last several years previous to these agreements, the group's laboratory has supplied over 300 samples of these reagents to other scientists.

Protein Crystal Annealing.
Cryocrystallography has become the method of choice for macromolecular crystallography because of the many advantages conferred by cryogenic data collection. The only significant disadvantage, in some cases, is increased mosaic spread as a result of flash cooling. In crystals containing large unit cells, increased mosaicity can make data reduction difficult to impossible due to reflection overlap. Scientists in the Physical Biosciences Group have developed a process that, when applied to a flash-cooled crystal, will often lower the mosaic spread. The process has been applied to a number of different macromolecular crystals. Refined values of mosaicity have been observed to improve by greater than a factor of two, and resolution may also improve. Experiments demonstrate that the molecular structure is unaffected by the annealing process. The process has been successfully applied to crystals grown using a number of precipitants. Crystals have been flash cooled using a variety of cryoprotectants and also by using Paratone N to remove surface solution from the crystal. The process is simple, reproducible, and promises to routinely improve data quality in flash-cooled crystals of biological macromolecules. It should also extend the application of cryogenic data collection to a wider range

of challenging crystals and simplify the handling of flash-cooled crystals.

Enhanced Electron Attachment to Highly-Excited Molecules Using a Plasma Mixing Scheme. Researchers have developed a novel plasma mixing technique to achieve enhanced electron attachment to highly-excited states of a variety of molecules. In this scheme, long-lived metastable states of inert gases are produced in a glow discharge and are extracted into an adjoining discharge-free region (target region); a suitable molecular gas is fed into the target region where they undergo excitation transfer from the inert gas metatstable states. The highly excited molecules thus produced attach slow electrons that are also extracted to the target region from the discharge region. Researchers observed negative ion formation in a variety of gases including methane, nitric oxide, and some fluorocarbons. In addition to the production of negative ions, this technique automatically leads to the formation of radicals (molecular fragments).

This technique may have a variety of applications including (1) an inexpensive negative ion (neutral beam) source, (2) the means to efficiently produce radicals for plasma processing of materials, and (3) the means to dissociate molecules in plasma remediation of volatile toxic compounds. Two patent disclosures have been filed regarding the last two applications.

A Novel Energy-Efficient Plasma Chemical Process for the Destruction of Volatile Toxic Compounds. Researchers have reported several achievements in developing a novel energy-efficient plasma chemical process for the destruction of volatile toxic compounds (VTC). The basic physics/chemistry involved in the dissociative electron attachment to highly excited molecules was unraveled in a plasma mixing apparatus. The researchers have developed a methodology for the evaluation of VTC destruction in a plasma mixing apparatus and completed a baseline study on the destruction of VTCs using a DC glow discharge apparatus.

Tumor Blood Vessels Targeted with Radioisotopes in Cancer Therapy. Therapy of metasteses from solid tumors remains as a major problem in curing carcinoma—the major cause of death from cancer in humans. Much current work has focused on tumor blood vessels as a target for directed therapy. Inhibition of the growth of new blood vessels has shown to keep tumors at bay, but does not actually cure the cancer. Working in a mouse model system, researchers from BABS and ATS have used radioisotopes targeted to tumor blood vessels to kill not only the cells lining the vessels, but also the tumor cells they serve. In the most recent experiments, the effects of an alpha-particle emitter, ^{213}Bi, and a beta-particle emitter ^{90}Y were compared. Alpha particles can travel only about 10 cell thicknesses in tissues but are extremely destructive in their short path length, whereas beta particles can travel 100 times farther, but are less destructive per unit path length.

The data show that mice bearing artificial metasteses in their lungs can be cured of the tumors with vascular targeting of either radioisotope; however, the beta-particle emitter causes more damage to the adjacent

normal lung as well as nearby organs. These results indicate that for radioimmunotherapy by vascular targeting to small tumors, up to 2000 cells or so, the "surgical strike" of a vessel targeted alpha-particle emitter is a more focused and specific agent for therapy.

Cloning and Characterization of an Enzyme Integral Tophotosynthetic Assimilation of Atmospheric Carbon Dioxide. The seemingly trite bumper sticker, "have you hugged a plant today?", actually reflects the profound truth that the entire animal kingdom requires plants for survival. We depend on plants for oxygen that we breathe, food that we eat, shelter that protects us from the elements, and medicinals that ward off disease. Fossilized plants fuel our automobiles, generate electricity, and provide innumerable consumer products and industrial materials. All of these benefits are consequences of the photosynthetic machinery by which plants capture and utilize the energy from sunlight to produce carbohydrates from atmospheric carbon dioxide (CO_2). Photosynthetic conversion of atmospheric CO_2 to carbohydrates, which is the only biospheric avenue for sequestration of this predominant greenhouse gas, is dependent on the concerted action of multiple enzymes that comprise the Calvin cycle. As inefficiency of this biosynthetic pathway severely curtails potential plant growth and yield, application of genetic engineering toward improved efficiency offers the prospect of enhanced biomass for energy, food, and global carbon management. Reaching such an ambitious, long-term goal is predicated on comprehensive understanding of mechanism and interplay of the requisite enzymes. Although some of the Calvin cycle enzymes are well-characterized, others have been glaringly neglected. For example, ribulose-5-phosphate epimerase, which is essential for the regeneration of the substrate for CO_2 fixation and also provides for critical linkage between distinct metabolic pathways, has never even been isolated from plants due to its extreme instability and low natural abundance. Scientists in the division have overcome these impediments by cloning the gene that encodes the spinach epimerase, expressing the gene in *Escherichia coli*, identifying conditions for stabilizing the epimerase, and isolating the overproduced enzyme. Structural, catalytic, and stability parameters of the purified, biologically active epimerase have been characterized, thereby paving the way for future mechanistic studies.

Laser Desorption Mass Spectrometry for Dynamic Mutation Analysis with Clinical Samples. Working with researchers at UT Medical Center, the Photophysics Group recently developed laser desorption mass spectrometry (LDMS) for dynamic mutation analysis with clinical samples, and gave the first demonstration for Huntington Disease (HD) and denatorubral-pallidoluysian atrophy (DRPLA), which are two major genetic neurodegenerative diseases. With LDMS, the number of trinucleotide repeats can be rapidly and reliably measured. The analysis time by LDMS per sample can be a few seconds per sample *versus* minutes to hours for conventional gel electrophoresis. With LDMS, no radioactive or dye tagging are required. Thus, the cost for analysis can be significantly lower. It has been found

that trinucleotide expansion is associated with many other serious genetic diseases. Among those diseases are Spinobulbar muscular atrophy (Kennedy disease), spinocerebellar ataxias, Fragile X, myotonic dystrophy, and FRAZE. LDMS is expected to be able to detect any of the above diseases. Since the analysis time is shorter and the cost can be lower, LDMS has the potential for population screening for these diseases. In addition to the detection of dynamic mutation, the ORNL researchers also cooperated with staff from the FBI Laboratory the Academia Sinica in Taiwan to apply this technology for DNA fingerprinting for forensic applications. LDMS was successfully used for DNA typing of short tandem repeat (STR) for different loci from several human samples for person identification. These results indicate LDMS can become an important tool for DNA fingerprinting for forensic applications in the future.

Licensing Agreement with Graviton, Inc., for Research in Micromachined Sensors. Culminating progress in developing novel micromachined sensors, an agreement for a multiyear research effort has been reached between ORNL and Graviton, Inc. of San Diego, CA. Graviton's license of intellectual property will allow commercial development in a number of fields. The licensing agreement represents the largest commitment of funds by an outside firm for technology transfer. As a part of the agreement, funds in from Graviton will be used for research supporting advanced sensing techniques. The novel concepts for sensing by microcantilevers originated several years ago in a DOE-funded basic research program. A recent internally funded program involving Life Sciences, I&C, and CASD successfully demonstrated the world's first palm-sized, wireless, multiple-input sensor.

Life Sciences Division Part of Initiative for Superconducting Transformer. A Superconductivity Partnership Initiative was signed on September 1, 1998, by the DOE and Waukesha Electric Systems, Waukesha, Wisconson, that is a mega boost toward next-generation transformers that are vastly more efficient, reliable, and compact.

The goal of the three-year $6-million cooperative agreement is to design, build and test a prototype transformer rated at 5 mega-volt-ampere with a 10-mega-volt-ampere overload—or emergency—capability. One megawatt will light 10,000 100-watt light bulbs. The initiative pools the resources of ORNL, Intermagnetics General, and Rochester Gas and Electric with those of transformer manufacturer Waukesha.

The 5/10-mega-volt-ampere superconducting transformer will be a scaled-down version of the final product, a 30-mega-volt-ampere commercial unit that will weigh half that of a conventional transformer. Furthermore, the superconducting transformer will not contain the thousands of gallons of cooling and insulating oil, a potential fire and environmental hazard. Superconducting transformers could be in wide use in about 20 years. The goal of the project is to fund cutting-edge research on difficult but important engineering problems.

Tasks include helping to develop high-voltage bushings that operate at cryogenic temperatures and conducting studies on electrical insulation materials, geometries, and sub-scale testing to verify the transformer design.

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Advances in computational sciences have facilitated approaches based on modeling and simulation for the prediction of behavior in many biological systems. The Computational Biosciences Section represents an inter-disciplinary, multi-investigator program designed to integrate key elements of the biosciences with expertise computing, Internet tools, intelligent systems, and bioinformation systems. The section's research program covers several high-impact scientific areas including methods for gene discovery and the analysis of genomes, simulation and modeling of protein folding and functional and structural classification using artificial intelligence-based techniques, systems for computational forensics and video processing, medical applications of intelligent systems, and the development of bioinformatics tools and systems for use by the research community. The interpretation of sequenced genomes represents the next great challenge at the interface of computing and biology, providing knowledge which is of immeasurable value to medical research, biotechnology, the pharmaceutical industry and researchers in a host of fields ranging from microorganism metabolism, to structural biology, to bioremediation. The section is developing new ways of recognizing and understanding the many important features of genomes and defining the infrastructure necessary for high quality and comprehensive analysis and sequence annotation processes. A comprehensive framework for analysis and annotation is being constructed using a distributed interoperable system of analysis servers and biodatabases together in a project called the "Genome Annotation Consortium." The section has designed and continues to develop major online analytical systems for genomics such as the GRAIL® and genQuest Internet servers. The generation of new genome sequence and functional data is also a focus of the section, which has an emerging effort to develop high-throughput

sequencing capabilities and advanced sequencing automation. Due to the flood of genome data, it is a high priority to improve the efficiency of protein characterization based on protein sequence. The section is developing new algorithms and tools for protein structure prediction and functional classification using a variety of techniques such as neural networks, protein threading, global optimization, genetic algorithms, and molecular dynamics. Also with the increased amount and complexity of biodata, an important emphasis is the architectural design and construction of integrated analysis systems, databases, and knowledge bases for such data. The section addresses fundamental research issues related to the design, development and maintenance of bioinformation databases, Internet tools, query systems, and other types of bioresources. Research issues include biodata representation, database and analysis system interoperation, data integration, automated agent-based data retrieval and update technologies, semantics, data mining, and knowledge discovery methods.

Selected Accomplishments

The GRAIL EXP High Performance Gene Modeling System. GRAIL® EXP is the world's most advanced and accurate sequence-based gene modeling code. It provides a unique capability to determine the structure of multiple genes in sequences using pattern recognition and ESTs. Significant changes in the structure of the GRAIL® EXP codes and advancements in the algorithms have made it possible to process the current 150 million base pairs of human genomic DNA for gene content. Most recently, the codes were restructured to improve accuracy and performance, and modularization into smaller logical units has enabled the system to be incorporated into a streamlined, client/server architecture. Tests of the code on the Paragon 150 and on workstation clusters have been completed with parallelization of the database search components of GRAIL® EXP facilitated using MPI (message passing interface) and PVM (parallel virtual machine) to allow execution on multiple processors. These scaling tests showed near-linear speedup and are a prerequisite to providing community-wide Internet access to Paragon-based GRAIL® EXP services by January 1, 1999.

Globally Optimal Protein Threading. Predicting the folded state of a protein sequence is essential to the understanding of the function of the protein. Protein threading, a technique for finding a globally optimal sequence-structure alignment, is considered to be one of the most promising computational techniques for protein tertiary structure predictions. Up till now there have been no computer algorithms that promise to solve the protein threading problem in its full complexity due to its overwhelming computational complexity and the lack of understanding about the problem. Researchers have recently, for the first time, developed a rigorous polynomial-time algorithm which can realistically solve the protein threading problem under a condition that is widely accepted by the protein threading community. This research has also lead to a number of discoveries about the computational properties of the protein threading problem, which potentially have

significant theoretical implications. These algorithms, as top computational biologist Dr. Richard Lathrop commented, "are innovative advances on the state of the art and represent much needed progress in the field." A summary of the initial research results were published in the *Journal of Computational Biology*, Fall 1998, as an invited paper.

The PROSPECT Protein Structure Prediction Toolkit. A suite of computational tools was recently developed for protein structure predictions by the Computational Protein Structure Group. These computational tools include a new polynomial-time protein threading program, a fast probabilistic protein threading program, an innovative protein secondary structure prediction program, and a number of new and effective methods for modeling and computing protein potential energies. A computer package called Protein Structure Prediction and Evaluation Computer Toolkit (PROSPECT), consisting of these tools, allows a user to predict a protein tertiary structure based on recognition of structures or partial structures in a large database of known protein structures that are potentially similar to the unknown. Using this package, the Computational Protein Structure Group has made predictions for all 43 target proteins in the recent community-wide protein structure prediction contest CASP-3. A number of research groups from organizations such as NIH, Lawrence Berkeley Laboratory, Amgen, and Boston University have expressed interest in utilizing the system in their research and in collaborative development related to the project.

Improvements in GRAIL® Spliced Message Prediction. A new approach to splice site recognition. Once genes have been located in sequences, predicting the detailed structure for the gene accurately using computation is still a considerable challenge. A major problem is false prediction of Donor and Acceptor splice sites because of the large number of false signals in DNA sequences. A new clustering technique was used to better separate real signals from noise based on a subpartitioning of splice sites (for example donors) into a number of clusters with similar properties, where the set of clusters reflects the diversity of donor classes. Two different strategies for cluster-initialization were tried: greedy algorithm and random selection. The greedy algorithm gave better results in terms of inter- and intra-cluster distances. The scoring function for evaluation of a candidate donor site is based on a linear combination of weighted distances between the candidate and each cluster. This approach outperforms the standard GRAIL® method and a combination of this clustering technique with the original GRAIL® donor prediction system provides even greater improvement in splice site accuracy.

Progress in Genome Annotation. ORNL and the Genome Annotation Consortium have made progress in building a computational resource that will help us understand the basic biology of humans, microbes, and other biological organisms. This resource will include a comprehensive genome-wide analysis of genome sequence data from different organisms and facilitate an integration of biological data around a genome-sequence framework. The need

for a comprehensive genome analysis process is pressing. Several organisms already have complete sequence data available; other organisms will be completed soon. The human genome and a considerable portion of the mouse genome will likely be completed in a few years. However, molecular biologists, medical researchers, environmental biologists, biotechnologists, and others will be unable to make best use of these sequences without a more organized and comprehensive computational analysis. ORNL and the Genome Annotation Consortium are building this needed genome analysis framework. The steps in this computational process are: (1) retrieving biological data and assembling genomes; (2) computing genes, proteins, and genome features from sequences and experimental data; (3) computing homology and function among genomes, genes, and gene products; (4) three-dimensional structure modeling of gene products; and (5) linking genes and gene products to biological pathways and systems. We have built infrastructure to keep up with the data flow in steps 1 and 2 and processes to add value to the sequence data, but the scale up to data flow in the next phase will require considerable enhancements. These computational analysis results, together with the relevant experimental results, need to be stored and accessed by researchers in several ways. We have made considerable progress in some data management, data storage, and data access issues. We have constructed one method of data access (Genome Channel) that is currently being used by the community and other data access methods will be released over the next fiscal year.

The Genome Channel Interface and Analysis Framework. The Genome Channel is a high-throughput distributed computational environment providing the genome community with various services, tools, and infrastructure for high-quality analysis and annotation of large-scale genome sequence data. The Genome Channel provides the only current and comprehensive assembled view of the human genome and attaches high-quality computational annotation to this data on a consistent basis. Users can access graphical and text-based interfaces for a comprehensive view of the genome information, including known genes and predicted gene structures, gene relatives in sequence databases, links to function information about new genes. The Genome Channel browser provides a highly intuitive view of the data at various levels of detail. An automated system has been constructed that provides and updates various kinds of computational analysis on genomes in the Genome Channel repository. It schedules the analysis of sequence contigs by the supported analysis tools in a concurrent, pipelined fashion. Software agents (search and update agents) perform automated data retrieval, collation, assembly, and fusion to link relevant function information from many databases to newly discovered genes. Computer-intensive analysis tools use distributed processing systems (namely, PVM or MPI) to achieve speedup by distributing the subtasks among a cluster of workstations or MPP machines such as the Intel Paragons.

Mammalian Genetics and Development Section

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ORNL established a Mammalian Genetics program soon after World War II specifically to assess the genetic effects of ionizing radiations in mammals. Experiments were carried out to determine both rates of induction of germline mutations and differential sensitivities of germ cell stages to induced genetic and cytotoxic damage in mice. In more recent experiments, a wide variety of chemicals have also been tested for germline mutagenicity. While this program generated the data upon which assessments of human risk following exposure are based, it also produced important findings in basic mammalian genetics and led to the establishment of the largest experimental mouse colony in the world. The current mission of the section is the mutagenesis, genetic mapping, and

functional analysis of the mouse as proxy mammal for human genetic studies. New mutations are being made in various regions of the mouse genome using both chemical and molecular mutagenesis strategies. Testing is ongoing for subtle phenotypes that would not traditionally have been recognized, even by very experienced technicians who consistently recognize mutations that alter general health, size and morphology, and normal motor behavior. For example, both existing and newly generated mutants are being evaluated for behavioral and biochemical aberrations. Mice that show abnormalities during any of these tests are analyzed in more detail. Technology is being developed to increase the sophistication, efficiency, and throughput for these behavioral assessments. Various bioactive molecules or byproducts in blood and urine are also being measured to monitor mutations induced in biochemical pathways.

Selected Accomplishments

Program Restructuring. In response to both the announced Health Effects Research funding recompetition and to our own sense of the need for redirection of scientific aims, we have revised our programmatic focus. Historically, we have targeted seven specific mouse genes/genome regions for experimental mutagenesis, a strategy that has allowed the accumulation of massive data sets for understanding the mutagenic potential of agents in the mammalian germline and has provided hundreds of mutant stocks for analysis of gene function. In these mutagenesis experiments, emphasis was on the detection of visible and lethal phenotypes resulting from induced genetic alterations. Additional programmatic funding has been devoted to separate but interactive principal investigator/group leader-driven research projects investigating aspects of the functional biology of specific gene mutations.

Beginning in FY 1999, we will use new mutagenesis strategies to accomplish a genome-wide approach to the induction of mutations as tools for the analysis of gene function. Essential elements will be:

(1) Chemical mutagenesis within selected genome segments defined by chromosomal deletions and inversions, including development of methods for applying this approach genome-wide.
(2) Broad-based screening of potential mutants for a wide variety of biochemical, behavioral, and morphological phenotypes.
(3) Cryopreservation, archiving, and distribution of all mutant stocks, and live maintenance of only that subset of stocks necessary for funded projects.
(4) Development of *in vitro* mutagenesis strategies, with emphasis on methods especially useful for generating meaningful changes in complex biochemical pathways.
(5) Basic research into the biology of gene function; the training of young scientists in the design and execution of biological experimentation will be an important element.
(6) Close interaction with bioinformatics and structural molecular biology research teams, so that our joint, integrated programs form a comprehensive functional genomics effort.

Role of the Agouti Gene in Cancer. Scientists in MGDS have been involved in research directed at the agouti gene. The goal of this project was to determine if the mouse agouti gene has a primary role in promoting skin cancer. The mouse agouti gene normally regulates the production of pigments involved in hair coloration. However, dominant mutations in the agouti gene cause the normal agouti protein to be produced at high levels throughout the body, resulting in yellow-haired mice that are obese, diabetic, and have an increased susceptibility to cancer of the skin, liver, lung, mammary gland, and urinary bladder. It is unclear if the agouti protein has a direct role in causing cancer, or if the cancers develop as a secondary consequence of the agouti-induced obesity and diabetes. If the cancers develop secondary to the onset of obesity and diabetes, then the agouti gene is unlikely to provide any new insights into the development of cancer. On the other hand, if the cancers develop as a direct effect of the action of agouti, then the agouti gene can be used as a tool to elucidate aspects of the molecular genetic basis of tumor development. The agouti gene was cloned here at ORNL, making it possible to now resolve this issue.

To determine if agouti has a primary role in the development of skin cancer, transgenic mice expressing high levels of agouti in the skin under the regulatory control of the human keratin-14 promoter (K14-agouti) were used in two-stage skin carcinogenesis experiments. K14-agouti mice are not obese or diabetic, but responded to chemical initiation of the skin with a significant increase in skin tumor prevalence (number of mice with tumors) and multiplicity (number of tumors per mouse) compared to nontransgenic control mice. Additionally, agouti acted synergistically with the phorbol ester TPA (12-O-tetradecanoylphorbol-13-acetate) to increase the cumulative prevalence, multiplicity, and malignant conversion rate of skin tumors, and to decrease the latency period of tumor formation. These data demonstrate conclusively that the agouti gene acts as a tumor promoter in skin carcinogenesis, and does so independent of the confounding factors of obesity and diabetes. These findings raise the possibility that deregulation of human agouti, which is 85% similar to the mouse protein, may also be associated with some types of human cancers.

A Mouse Model for the Human Angelman Syndrome. Children born with Angelman syndrome (AS), also known as the "happy puppet syndrome," suffer from severe mental retardation, motor delay, seizures, and behavioral manifestations such as absence of speech, sleep disorders, unbalanced gait, stiff and puppet-like limb movements, and inappropriate laughter. Mutations in a gene, ubiquitin ligase enzyme 3A (*Ube3A*), found in human chromosome 15q, have been implicated in causing AS.

Among the radiation-induced mutations generated in MGDS's program is a deletion (p^{30PUb}) in mouse chromosome 7 that includes the mouse version of the AS gene, *Ube3A*. Since large deletions in human 15q cause 70% of known cases of AS, this similar deletion in a strain of mice allows us to determine which of the physical, mental, and behavioral symptoms characteristic of AS can be

studied in mice as well. To date, tests have proven that AS mice are quite below normal in their ability to maintain position on a rotating rod; this test measures balance and coordination. AS mice are also much less active than normal mice in a test for exploratory behavior in an activity-test chamber. Interestingly, the performance of mice on these tests improves somewhat with age, mirroring the gradually improving (up to a point) clinical picture seen in AS children as they mature. Further tests are under way to measure the ability of AS mice to remember and try to avoid an unpleasant stimulus as a model for mental retardation, and to assess their 24-hour biorhythms as a model for sleep disturbance.

We have used dissected mouse brains to show which specific brain regions express the AS gene, an experiment obviously not possible in humans. *Ube3a* is normally expressed in the cerebellum, the center for motor control, and in the hippocampus, thought to control some kinds of learning and memory. Importantly, in both humans and mice, AS occurs only when the mutant gene is inherited maternally. This genetic phenomenon, known as genomic imprinting, is poorly understood and we hope to gather crucial information not only about the functional causes of AS but also about the mechanisms that control imprinting.

A Novel Gene in The Mouse P Region, Expressed Exclusively in the Central Nervous System, Maps to a Human Chromosomal Region Associated with Mental Retardation. One of the Oak Ridge radiation-induced chromosomal deletions, p^{8FDFoD}, at the pink-eyed dilution (*p*) locus in mouse chromosome 7, disrupts a gene expressed only in the brain and spinal cord. This gene, named *Ihw* (included in the human WAGR region) encodes two transcripts that we have cloned and sequenced; the DNA sequences show no similarity to other known genes.

WAGR is a human clinical syndrome, consisting of Wilms' tumor (a lethal kidney cancer), aniridia (absence of the iris of the eye), genito-urinary abnormalities, and mental retardation, caused by the deletion of a group of genes in human chromosome 15. The W, A, and G components map as a group to mouse chromosome 2, but the gene grouping has been separated in the mouse so that the R component is in the *p* region on mouse chromosome 7. *Ihw* is one of a small cluster of brain-specific genes that may determine the mental retardation in WAGR patients.

Researchers in MGDS have engineered a transgenic knockout of the *Ihw* gene, and are breeding mice that will have both copies of *Ihw* disabled. Those mice will go through our behavior-testing center to determine if the absence of the *Ihw* gene product causes abnormalites in mice that may mimic the mental retardation associated with WAGR in humans.

Major Cryopreservation Effort for Mutant Mouse Stocks. MGDS has launched a major cryopreservation effort for mutant mouse stocks. By freezing sperm and/or embryos, we propose to become a major archiving and distribution center for experimentally induced mouse mutations that have significant phenotypes of interest to the functional genomics and wider biological communities. Sperm freezing will provide a facile means for distributing any mouse mutation that is

not male-lethal or male-sterile to the scientific community, and thawed embryos can very reliably be used to reconstitute many stocks, especially inbred strains, via transfer into recipient females.

Cryopreservation will also provide a logistically feasible means for rederiving the conventional (not pathogen-free) ORNL colony into a new, specific-pathogen-free (SPF) facility, when that facility becomes available within three years. We are endeavoring to freeze down mutant stocks now so that only those stocks that will be actively used upon opening of the new facility need be reconstituted. In the interim before our move into the clean facility, we will cryopreserve many stocks not used in active investigations in order to free our genetics staff for new experimental work.

Since the effort has been running five to seven days a week, we have frozen 3000 embryos; this is more than were frozen in the entire previous year. We have also frozen sperm from 39 mutant stocks, and are collecting mice from an additional 80 stocks into the freezing queue. The effort has included the quality-control measures necessary to ensure that our recovered embryos are fully viable and our thawed sperm competent for fertilization either by artificial insemination or *in vitro* fertilization. We are also in active collaboration to test the efficacy of freezing whole ovaries for subdivision and transplantation into recipient females; this method would be invaluable for male-sterile and female-subfertile stocks. This collaboration includes testing to determine if embryos, sperm, and ovaries from non-SPF stocks still transmit any potential pathogens when used to reconstitute live stocks.

Identification of Gene Associated with Deafness, Gastritis And Gastric Lymphoma. Researchers in MGDS have determined that the disruption of the mouse mucin 2 (*muc2*) gene in a unique Oak Ridge mutation called *14Gso* produces gastritis and gastric cancer and may also be involved in hereditary deafness.

14Gso is an X-ray induced mutation. Mutant mice were easily identified because they exhibit a persistent circling and head-bobbing behavior, indicative of defects in the inner ear, the organ where balance and hearing are controlled. Direct examination of the inner ear structures of *14Gso* mice revealed severe degeneration such as a collapse of membrane structures in the cochlea and vestibular apparatus at birth, progressive deterioration of hair cells, nerve and supporting cells. Culiat and Stubbs conducted research directed toward the identification of the gene(s) responsible for these defects and further biological characterization of the *14Gso* mutation.

Cytogenetic analysis showed that *14Gso* is a mutation due to the breakage and exchange of the tips of mouse chromosome 7 and 10. Further cytogenetic and physical mapping data of the mutation indicated that the breakpoint region in chromosome 7 is located at the regulatory region of *muc2* (intestinal mucin 2), gene coding for a major protein in the mucus lining of the intestine. Since a region of the human *muc2* gene was very similar to the gene associated with deafness in man (Norrie Disease Protein), the expression of this

gene in *14Gso* was investigated. The *muc2* gene expression is abnormal in mutant mice, indicating a loss of regulation of the normal levels and tissue specificity. The gene is normally expressed in the intestine and in mutant mice it is found at very high levels in the stomach and also misexpressed in the kidney and lungs. In man, the overexpression of *muc2* (could be induced due to infection by the bacterium causing ulcer, Helicobacter pylori) in the stomach is associated with chronic gastritis leading to gastric lymphomas and adenocarcinomas. When stomachs of mutant mice were examined, these same defects were discovered. *14Gso* is therefore a good mouse model for studying the progression of gastric cancer from chronic gastritis.

Abnormal expression of *muc2* in *14Gso* in the inner ear has not been demonstrated; however, it is well known that mucin-like proteins are found in the mammalian inner ear, though their functions are not known. *Muc2* is very large and so far only pieces of the mouse gene have been cloned and are useful as probes for expression in the inner ear. The region of mouse *muc2* with highest homology to the Norrie Disease protein has been difficult to clone. Cloning and sequencing of the entire gene is currently being done at Lawrence Livermore National Laboratory. The cloning and characterization of the mutated regions in *14Gso* (both translocation breakpoints in 10 and 7) will be completed as a collaborative project between LLNL and ORNL.

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Environmental Technology Section

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Assessment Technology Section

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The focus of this section is to conduct research and technological applications aimed at solving problems of national and international importance in areas concerning human health and the environment. Environmental programs are aimed at detecting, characterizing, and assessing the impacts of all classes of radiological and chemical environmental pollutants. These efforts include performing site characterizations at potentially contaminated facilities across the country, developing and testing new instruments and techniques for detecting chemical and radiological pollutants, and ensuring the quality of data obtained from field measurements and laboratory analyses. In addition to pollutant

characterization programs, life cycle analysis studies are also conducted in areas concerning waste minimization, remedial action determination, and decontamination and decommissioning to optimize regulatory, economic, social, and environmental concerns in the decision-making process. Human health studies include nuclear medicine programs aimed at applying radiopharmaceuticals to the diagnosis and therapy of neural, cardiac, and cancer diseases; and biokinetic and metabolic computer modeling for calculating the effects of radiological and chemical insults on humans. In support of these efforts, state-of-the-art data management, training, information analysis, and communication programs are maintained.

Selected Accomplishments

F. F. Knapp Appointed to Corporate Fellow at ORNL. The Lockheed Martin Energy Research Corporation appointed Dr. F. F. "Russ" Knapp to the position of Corporate Fellow at ORNL. Dr. Knapp is currently the leader of the Nuclear Medicine Group and is an internationally recognized authority in the development and application of radioisotopes to diagnosis and therapy of cancer, heart disease, and neurological diseases. This recognizes his accomplishments and contributions to the field of nuclear medicine.

Dosimetry Research Group Publishes Federal Guidance Report 13 on Environmental Dose Conversion Factors. The Dosimetry Research Group prepared and published Federal Guidance Report 13 which provides nationally recommended radiation dose conversion factors for environmental radionuclides. Senior staff led the effort to develop exposure scenarios, perform radiation transport calculations using computer codes and nuclear data developed by the Dosimetry Research Group for radionuclides of interest, and prepare the summary report which was issued as an EPA document. Federal Guidance Report 13 will provide the basis for exposure estimates for a variety of applications in the United States.

ORNL Awarded Contract to Perform Major Environmental Pollutant Assessment for the U.S. Postal Service. Staff of the Assessment Technology Section successfully completed a pilot study which led to receipt of a major contract to perform a multi-year environmental pollutant assessment at facilities in the midwest United States for the U. S. Postal Service. This effort required development of field measurement and assessment capabilities for lead, asbestos, and radon pollutants; development of remote and local data processing and evaluation systems; implementation of comprehensive measurement and quality assurance programs; and development of report preparation systems. The successful completion of the pilot program resulted in the awarding of the full multi-year, 4,000-site project which will enable ORNL to showcase its human health assessment expertise, measurement and analytical capabilities, and data management capabilities.

Nuclear Medicine Group Develops Method to Prevent Coronary Restenosis Following Balloon Angioplasty. Investigators in the Nuclear Medicine Group developed a method to prevent coronary restenosis following balloon angioplasty. The Group developed a method to apply rhenium-188 to prevent arterial blockage by coating a stent which allows irradiation during angioplasty. This effort resulted in an invention licensed by the Mallinkrodt Medical Corporation which consists of a special ion exchange system developed at ORNL that provides the highly concentrated form of rhenium required for this procedure. In addition, a cooperative research and development agreement (CRADA) was awarded with Innerdyne, Inc., to evaluate the effectiveness of this technology with international collaborators.

DOE Certifies M-100 Radwaste Boxes Made from Recycled Metal. DOE awarded a type 7A certification for the M-100 class of boxes which are to be fabricated from recycled metal and used to contain low-level radioactive waste during transport. The effort was championed by DOE's Office of Environmental Restoration and was aimed at developing containers that would reduce fabrication and disposal costs, maximize worker and public safety, and facilitate inspection and quality control functions. The M-100 containers should be ASTM certified in the near future, and the containers should be available to DOE and contractors in November 1998.

NCRP Publishes Report on Radionuclide Exposure to the Embryo/Fetus. On September 25, 1998, the National Council on Radiation Protection and Measurements (NCRP) published NCRP Report No. 128 titled "Radionuclide Exposure of the Embryo/Fetus. The leader of the Dosimetry Research Group was instrumental in the publication of this document in his role as consultant. The report describes effects of radionuclide exposure on the embryo/fetus, concerns of radiation exposure during pregnancy, dose estimation methods, and exposure limits. Primary contributions to this effort involved developing biokinetic and metabolic models and performing associated dose calculations for the embryo/fetus and mother following exposure to a wide variety of radionuclides.

ORNL Nuclear Medicine Programs Highlighted in DOE International Collaboration Effort. In an address the International Atomic Energy Agency in Vienna, Austria, Secretary of Energy Bill Richardson announced DOE participation in an international collaboration on research and development into the diagnosis and treatment of life-threatening illnesses using radioisotopes. In particular, the United States will provide surplus radioisotopes for nuclear medicine applications to heart disease, cancer, and bone pain diagnosis and therapies. The Nuclear Medicine Program at ORNL was highlighted in Richardson's presentation as being the key supplier of reactor-produced radioisotopes and rhenium-188 produced using a clinical generator developed at ORNL. Particular projects being conducted by the Nuclear Medicine Group were also highlighted including labeling of antibodies for cancer therapy, experimental procedures that prevent or retard

restenosis following coronary angioplasty, and cancer bone pain relief.

Assessment Technology Staff Receives Contract to Evaluate Ink for the U.S. Postal Service. The Environmental Management and Policy Office of the U.S. Postal Service has contracted with the Assessment Technology Section to evaluate ink used in mail processing systems. This effort involves determining the chemical composition of the ink, determining how it interacts with processing equipment, investigating the waste characteristics and disposal impacts, evaluating health concerns, and developing optimum specifications for ink from commercial suppliers. Specifications which take into account operational, health, waste, and processing costs should result in significant savings for the Postal Service.

Radon Mitigation Effort Completed on Guam. A major effort to conduct mitigation of radon hazard in facilities on Guam was completed in March 1998. This effort was funded by the U.S. Navy. A total of 119 facilities with initially measured radon levels greater than 20 pCi/L were mitigated over a five-week period beginning in February. This effort is the largest radon mitigation program conducted at one time to date.

Environmental Technology Section

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The necessity for the Department of Energy and the Department of Defense to remedy pollution caused by past environmental practices has resulted in the mission of the Environmental Technology Section. Environmental Technology staff are involved in characterizing and assessing the extent of environmental contamination, developing and demonstrating technologies to remedy contamination, and assuring that sites being cleaned by other organizations are adequately planned, conducted, and documented. The majority of the section's projects concentrate on developing new techniques, processes, and equipment to detect or remedy a wide variety of environmental pollutant, both radioactive and chemical. These activities are complemented by strong environmental statistical and technical programming support. Devices, technologies, and software created by section staff are transferred to private sector or other federal agencies whenever possible.

Selected Accomplishments

In Situ Chemical Oxidant Recirculation (ISCOR) Pilot Project. ETS staff designed, constructed, and operated the *In Situ* Chemical Oxidant Recirculation (ISCOR) pilot project in the 5-Unit Investigative Area of Quadrant I, Portsmouth Gaseous Diffusion Plant (PORTS). The project was developed based on an agreement between DOE and the Ohio Environmental Protection Agency (EPA) to gather additional technology information to assist in the development of Corrective Measures Study (CMS) alternatives at PORTS. The ISCOR approach involves injection through a central well and extraction from a network of perimeter wells located at fixed distances from the injection well. The

extracted groundwater is dosed with oxidant, $NaMnO_4$, and re-injected to the aquifer where it degrades organic compounds (present as either dissolved phase or free phase) on contact. This oxidant delivery technique is applicable to relatively permeable, saturated subsurface media contaminated with ganglia and/or pools of DNAPLs with an underlying aquitard. Results from the pilot project conducted during July through September 1999 indicated promise of the "5-spot" ISCOR approach as a remedial technology in an area of concern at PORTS while applying an aggressive remediation technology to a known area of groundwater contamination. The work was directed and funded by DOE and implemented by Bechtel Jacobs Company and ORNL. ORNL is currently overseeing the installation of additional injection/extraction well networks in the 5-Unit Investigative Area that will be implemented and deployed in FY 1999 by Bechtel Jacobs and ORNL.

Confirmatory Radiological Survey of the National Conversion Pilot Project Buildings 883 and 865 at the Rocky Flats Environmental Technology Site. ETS staff performed an independent verification radiological survey of interior walls, floors, and machinery in Buildings 883 and 865 at the Rocky Flats Environmental Technology Site (RFETS) for DOE Rocky Flats Field Office (DOE-RFFO). The verification included reviews of pertinent project documents, field measurements for beryllium, beta and alpha radiations, and gamma exposure rate ranges. The purpose of the independent verification was to verify the accuracy and completeness of measurements and the credibility of procedures used, resulting in an independent assessment of resulting site conditions versus project plans prior to project closeout. ETS's data indicated that removable contamination of lower walls and floors had been mitigated to levels below regulatory concern. Fixed radiological contamination, primarily depleted uranium, remained on equipment and floor surfaces. The original purpose of the verification was to determine if radiation and beryllium levels were reduced to acceptable concentrations for radiation workers. However, DOE-RFFO decided to transition the buildings for decontamination and decommissioning (D&D) rather than use the building for recycling of scrap metal as originally planned. Therefore, the level of characterization requested by DOE-RFFO was determined to be inadequate for D&D purposes and ETS recommended additional characterization in its final report issued June 1998.

Final Analysis Report of a Qualitative Radiological Survey of the CS-10 BOMARC Facility at the Otis Air National Guard Base, Massachusetts Military Reservation, Falmouth, Massachusetts. ETS staff performed a radiological scoping survey at the CS-10 BOMARC missile site on the Otis Air National Guard Base Massachusetts Military Reservation for the Air Force Center for Environmental Excellence (AFCEE) and the Hazardous Waste Remedial Action Program (HAZWRAP). This project had high public visibility and regulatory oversight (U. S. EPA and Massachusetts Department of Environmental Protection) due to CS-10's proximity to the town of Sandwich. The

objective of the survey was to determine if radioactivity was present at the BOMARC facility in concentrations exceeding natural background levels. There was no historical evidence to indicate that nuclear warheads were actually present or, if they were, that radioactivity escaped into the surrounding facilities and environment. Therefore, the purpose of this survey and associated soil sampling was to provide reasonable assurance of the absence of weapons-related radionuclide concentrations. The assumption for this analysis was that concentrations of radionuclides in soil and building materials did not exceed concentrations of nearby background sites. A statistical sampling procedure using the Visual Sampling Plan was developed to assess gross radiation levels in 56 abandoned missile shelters and 3 buildings (used for missile maintenance). Random locations were also selected for soil sampling in surrounding areas. Over 2500 radiation measurements and 150 soil samples were statistically analyzed. This analysis revealed that weapons-related radioactive contamination was not present at the BOMARC facility and surrounding areas and that additional characterization was not justified. More importantly, the results showed that the CS-10 BOMARC facility does not pose a radiological hazard to the environment, workers, visitors, or the public living in nearby residential areas. The sampling, statistical, and analytical techniques used held up under close public and regulatory scrutiny. A report discussing the findings was published in January 1999.

Independent Verification for Monticello Vicinity Properties Project (MVP) and Monticello Remedial Action Project (MRAP). ETS is designated the Independent Verification Contractor (IVC) for the Department of Energy Grand Junction Office (DOE-GJO) for the Monticello Projects based on a tri-party agreement between the DOE and the EPA, Region 8, and the Utah Department of Environmental Quality (UDEQ). The major scope of work for ETS staff on the MVP Project was to work with the Remedial Action Contractor (RAC) and the DOE to finalize the accelerated schedule for the delistment of the Monticello, Utah, vicinity properties. Staff conducted reviews of property completion reports and wrote a corresponding independent verification report recommending the certification status for individual properties to the DOE. ETS staff worked with the EPA to conduct investigative review and field survey on properties with suspect remedial action documentation. Independent verification funding was cut on the MRAP Project for the Monticello Mill Site (Operable Unit - I) and associated Peripheral Properties (Operable Unit - II) during the first half of 1998. In April, the DOE requested re-evaluation for independent verification for Monticello. In May, additional funds were approved by the DOE. The Independent Verification of the Monticello Remedial Action (OU- I) Work Plan Addendum report was submitted in June. ETS staff conducted on-site field survey throughout the field season on 10% of the verified Mill Site and Peripheral Properties area. Gamma surveys coupled with Global Positioning System (GPS) were completed. Contour

maps were generated at the time of the survey using Surfer software. This provided for "in the field" identification of elevated gamma which exceeded 30% of the background and which required further investigation to document that the verified area was remediated to EPA standards in 40CFR192.12 and the SFMP Hot-Spot Guideline. Site remedial action protocol is guided by analysis of all soil samples for Ra-226. ETS staff provided preliminary Ra-226 analysis using their mobile Opposed Crystal Gamma Spectroscopy (OCS) van or the ETS gamma spectroscopy lab. Independent soil samples were collected to document Th-230 and total U in the area of the final Montezuma Creek alignment and soil samples were collected to document metals concentrations associated with the remediated portions of the four on-site tailings piles. Document review for MRAP included a quarterly evaluation of the RAC database for split sample selection and validation that Ra-226 as a field excavation control guide is adequate to meet site standards for Th-230 and total U.

In Situ Remediation of DNAPL Compounds in Low Permeability Media. Dense non-aqueous phase liquid (DNAPL) compounds present in low permeability media (LPM) pose major challenges with assessment of their behavior and implementation of effective in situ remediation technologies. In situ remediation technology development has largely overlooked treatment of DNAPLs in LPM. Poor accessibility to the contaminants and the difficulty in delivery of treatment reagents have rendered conventional bioremediation, vapor extraction, and pump-and-treat ineffective for this type of contaminated media. As a result of the need for solutions and the gap in the current knowledge and technology base, a project was initiated to evaluate in situ remediation technologies for both enhanced mass removal and in place destruction of DNAPL compounds in LPM, specifically chlorinated solvents (e.g., trichloroethene [TCE] and perchloroethene [PCE]). This project was sponsored by the DOE Office of Science and Technology (OST) and the DOE Portsmouth Gaseous Diffusion Plant (PORTS) Site Office with significant leveraging with the American Petroleum Institute and private industry.

Since the initiation of the project in 1993, several *in situ* technologies for mass recovery and in situ degradation have been demonstrated at three sites in the United States and Canada for remediation of DNAPLs in both the vadose and saturated zones of LPM. The work during the past four years has focused on *in situ* remediation by either (1) thermally enhanced mass recovery using hydraulic fractures and soil vapor extraction, (2) *in situ* destruction involving redox treatment agents (permanganate solutions and solids (oxidative particle mixtures [OPM]) and/or iron metal solids) delivered by horizontal hydraulic fractures, (3) *in situ* destruction involving permanganate OPM delivered by vertical coreholes, or (4) *in situ* destruction involving redox treatment agents (peroxide or permanganate solutions and/or iron metal solids) delivered by vertical permeation lances. In addition, numerical and experimental analyses of the mobility of residual NAPLs versus varying degrees of remediation have been conducted.

Based on these efforts, a promising *in situ* remediation approach selected for deployment includes enhanced delivery of reactive agents through soil fracturing and/or permeation for in-place destruction. The current goal of the ongoing project is to advance the technologies developed and demonstrated through transfer of the knowledge and experience gained into a standard of practice. This will be accomplished through multiple deployments at multiple sites over several years.

During calendar year 1997, ETS staff were responsible for oversight and field execution of the continuing comparative demonstration of in situ remediation of low permeable media at the X-231A site at PORTS. The significant activities included pre- and post characterization, operation, and reporting. The field demonstration consisted of four systems:

- Hydraulic fracture enhanced steam flushing for 45 days.
- Hydraulic fracture enhance hot air flushing for 45 days,
- Evaluation of forced advection operation of reactive horizontal barriers with zero valence iron and oxidative particle mixtures (OPMs).
- Evaluation of passive operation of reactive horizontal barriers with zero valence iron and oxidative particle mixtures.

During calendar year 1998, ETS staff provided oversight and execution of a field scale implementation of OPM propped hydraulic fractures. While several problems were encountered, valuable insight was gained into OPM handling and delivery which has lead to additional development work.

Comparison of Groundwater Alternatives (CGA) Study. ETS staff conducted Phase I of a Comparison of Groundwater Alternatives (CGA) study at Naval Air Station (NAS), Fallon, Nevada. The purpose of Phase I was to develop potential alternatives for remediating dissolved-phase groundwater contaminant plumes at six NAS Fallon sites. Primary groundwater contaminants at the sites are jet fuel and chlorinated solvents. Potential groundwater remedial alternatives developed for the sites during Phase I included long-term monitoring, intrinsic remediation (natural attenuation), enhanced *in situ* bioremediation (both aerobic and anaerobic), hydraulic containment with aboveground treatment, and groundwater extraction with aboveground treatment. Potential groundwater containment and extraction technologies evaluated were pumping wells, interceptor drains, and slurry walls with pumping wells. The potential aboveground treatment technologies evaluated were aerobic bioreactor systems and air stripping with activated carbon polishing.

The CGA study (Phase II) is ongoing and will include a comparative evaluation of the potential remedial alternatives for each site based on effectiveness, implementability, and cost. Phase II will conclude with a recommendation of a preferred remedial alternative for each site.

Grand Junction Office Remedial Action Project (GJORAP). ETS was assigned as the IV contractor for DOE's GJORAP by the DOE D&D Branch Division of the

Office of Environmental Restoration and Waste Management. The purpose of the GJORAP is to characterize, remediate, and verify cleanup of chemical and radiological contamination from past activities at the DOE-GJO facilities. Included in the D&D efforts are the buildings, exterior land area, and the underlying aquifer at the facility. The ETS role in this effort is to verify that all radioactively and chemically contaminated material is removed to levels that are consistent with the DOE limits of release and the Record of Decision for the site. During 1997 and 1998, ETS performed verifications on nine buildings (released for occupancy), quarterly groundwater sampling, verification of outdoor areas of the GJO facility (including USRADS surveys and soil sampling), groundwater modeling, verifications of footprints of demolished buildings (31A, 33, and 35), scans and soil sampling, and verifications of release surveys of demo debris going to municipal landfill from demolition of buildings.

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The major goal of this section is to apply scientific and regulatory analysis expertise to develop methods and provide information which will enhance the decision-making process. Objectives in this process are (1) assessing the impact of toxic and hazardous chemicals and other agents on human health and environmental quality, such as the development of acute exposure guideline levels, reference doses/concentrations and slope factors, and review of pesticide registrants' submissions; (2) analyzing federal and state environmental and radiation protection policies, decommissioning and decontamination activities, and energy and utilization; (3) developing computerized toxicological and risk-assessment databases and analysis systems, such as the Genetic Toxicology Database (GeneTox) and the

Risk Assessment Information System (RAIS), for predictive toxicity, fate transport modeling, and design of new chemicals; (4) developing PC-based knowledge systems for environmental, safety, and health (ES&H) compliance applications and decision-making systems; these support tools include the Intelligent Materials and Environmental Lifecycle Design Advisor (IMELDA), which facilitates new product design; and the Spatial Analysis and Decision Assistance (SADA), which combines ES&H risk factors with geospatial information and cost-benefit analysis; (5) providing "value-added" information analysis for projects such as the AIDS/Cancer registries, which elucidate the mechanism of disease progression and treatment; providing support to the Nuclear Regulatory Commission's (NRC) Materials Licensing Program by identifying and tracking over 30,000 closed sites requiring remediation as well as accountability for sealed sources; and tracking and follow-up on General Licenses tracking registration; (6) preparing technical communication products for nationally significant programs, such as the technical newsletters *Human Genome News*, *CFCC News,* and *Energy Crops Forum*; and (7) providing responses to queries on toxicological, regulatory, and remedial activities through the use of Toxicology Information Response Center (TIRC) and Remedial Action Program Information Center (RAPIC) resources, which include some 1,200 health and ecological risk documents, a registry dictionary of over 30,000 chemicals and agents, and 200,000 printed references. In all efforts, section staff emphasize the application of new and more efficient methods to the processes of conducting risk assessment, regulatory analysis, and data/information management and dissemination, such as those offered through use of Web-based applications.

The new M&O contractor, Bechtel-Jacobs LLC, now manages the local cleanup activities for the DOE Oak Ridge Operations (DOE-ORO). Due to this transition, work previously performed by TARA has been drastically reduced in this area.

Selected Accomplishments

Assessment Reports for National Program of Acute Exposure Guidance Levels (AEGLs). Under the Federal Advisory Committee Act, the U.S EPA established a National Advisory Committee (NAC) to develop AEGLs for hazardous substances. The committee is comprised of individuals of federal/state agencies and the private sector representing industry and non-profit organizations. In a concerted effort, TARA's toxicologists and NAC members identify, review, and interpret relevant toxicological and other scientific data and develop AEGL's for high-priority, acutely toxic chemicals. AEGLs represent ceiling exposure values for the general public and are applicable for emergency exposure periods ranging from less than 1 hour to 8 hours. Three AEGL values are developed for each of four exposure periods (30 min., 1-, 4-, and 8 hrs). Each value is distinguished by varying degrees of severity of toxic effects as defined by AEGL-1, -2, and -3,. These toxicity values will be used for the Clean Air Act risk management planning and emergency evacuation determinations. To date, we have developed 19 chemicals for NAS

review, 38 chemicals are in proposed status, 11 chemicals are in draft status, and 8 chemicals are awaiting new data.

Office of Pesticide Programs, Document Evaluation Reviews (EPA). Prior to the registration or re-registration of a pesticide, the U.S EPA, Office of Pesticide Programs (OPP), must determine whether the chemical will cause reasonable adverse effects on humans and the environment under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In the process of making this determination, EPA reviews all data submitted by the registrant to support the effectiveness and safety of the chemical, published reports or studies from the open literature, unpublished reports or studies which bear on the issues at hand, and the chemical's general and environmental chemistry relationship to possible human and domestic animal exposure. TARA assists the OPP in this mission by performing technical and critical evaluations of the data submitted for the registration and re-registration process.

Progress of the Environmental Genome Project (EGP). TARA's Human Genome and Toxicology (HG&T) Group has recently teamed with staff of the Computational Biosciences Section on a project for NIEHS to develop a gene identification resource and database. Specifically, the work involves (1) providing National Institute of Environmental Health Sciences (NIEHS) with a list of known genes that are involved in responses to environmental agents that may, in turn, influence human susceptibility to disease, and (2) providing additional information for use in selecting a subset of the candidate gene listing for resequencing. This project contributes to the EGP goal of identifying environmental agents—particularly chemicals— that may cause a genetic-based disease and place the population at risk. Achieving this goal may lead to more effective disease prevention and improved public health.

Management of the Human Genome Management Information System (HGMIS). HGMIS functions as primary communication resource for the Human Genome Program (HGP). HGMIS produces the quarterly *Human Genome News* (HGN), and the DOE *Primer on Molecular Genetics*, as well as progress reports on contractor-grantee workshop proceedings. In its role as an information clearinghouse, HGMIS responds to numerous inquiries annually for information about the HGP and requests for copies of DOE- or HGMIS-generated publications. A text-based World Wide Web server is maintained that provides excellent coverage of topics relevant to the HGP for scientists and non-scientists. The work of HGMIS contributes to the increased use of HGP-generated resources, the reduction of duplicative research efforts, and the fostering of collaborations and contributions from other disciplines that benefit the HGP and DOE-OBER's research interests. As more research results and discoveries become available from the HGP each year, the role of HGMIS increases in importance.

DOE-ORO Risk Assessment Program. During this report period, TARA staff continued to provide support to the DOE-ORO Risk Assessment Program by managing the integration activities for all risk assessments conducted at ORO Sites. As part of this effort we developed improved risk assessment methods such as statistical applications for the identification of site-related contamination and revised ORO-specific risk assessment guidance. This work also included the maintenance of the Environmental Management Risk Ranking System, a critical tool employed in the determination of project sequencing for all ORO-EM projects.

Interaction with DOE Center for Risk Excellence. The section provided technical support to the DOE Center for Risk Excellence (CRE). This included the development of Web sites and links to available risk information, improvements to the Risk Assessment Information System (RAIS); demonstrated the RAIS system to various field offices (the use of the RAIS has increased by 400% since this effort began); participated on a team of CRE and Operations Office representatives to develop risk guidance for the DOE Paths to Closure document, and completed the OR Risk Profile.

Environmental Technology Verification of Environmental Decision Support Software (EPA). The Environmental Technology Verification (ETV) Program was created by the EPA to facilitate the deployment of innovative technologies by substantially accelerating the acceptance and use of improved and cost-effective technologies. The goal of the ETV Program is to promote environmental protection. TARA provides support to ETV by designing and conducting performance evaluations of environmental decision support software. The evaluations focus on the utility of decision support software in addressing environmental problems. Three endpoints were selected for technical evaluation: (1) Visualization, (2) Sample Optimization, and (3) Cost/Benefit Analysis. In CY 1998, evaluations were conducted on six environmental decision support softwares to verify their performance.

Impact of Deregulation on Electric Utility Industry (NRC). TARA assisted NRC in evaluating the impact of deregulation on the long-term ability of power reactor licensees to adequately finance safe operation and decommissioning of nuclear power plants, whether the plant is operated to the end of its licensed term or is shut down prematurely. TARA provided evaluations of state deregulation and restructuring initiatives which affect the traditional cost of service regulation of NRC power reactor licensees in California, Illinois, Massachusetts, New Hampshire, New York, Rhode Island, and Pennsylvania. Each state's restructuring initiative was analyzed with particular attention paid to issues of stranded costs, going-forward costs and decommissioning costs as they applied to nuclear power plants and their safe operation.

Facilities, Infrastructure and Support

Laboratory Animal Resources

Operations and Support Section

Mouse Genetics Research Facility (DOE User Facility)

DNA Sequencing Laboratory

Gene Expression Chip Laboratory

Center for Dosimetry and Biokinetic Modeling

Center for Life Cycle Analysis

Center for Independent Environmental Assessment

Laboratory Animal Resources Section

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[1]Retired or terminated employment with Life Sciences Division in 1997 or 1998

The section is dedicated to maintaining the highest standard of animal care and welfare, ensuring the best quality of animals for research activities and support of divisional research initiatives utilizing animals. The animal resource program is responsible for ensuring continued accreditation by the Association for Assessment and Accreditation of Laboratory Animal Care, International, compliance with federal regulations of the Animal Welfare Act and the Public Health Service Policy on Humane Care and Use of Laboratory Animals, and maintaining standards in accordance with the National Research Council's "Guide for the Care and Use of Laboratory Animals." Efforts provided by the section support care for the large experimental mouse colony utilized by the Mammalian Genetics and Development Section as well as animals utilized by the Assessment Technology and the Biochemistry and Biophysics Sections. The section is headed by a veterinarian who is a Diplomate of the American College of Laboratory Animal Medicine. Support staff includes a supervisor and 19 full-time bargaining unit animal care technicians. The section provides husbandry requirements for approximately 70,000 laboratory mice and a minimal number of rats and oversees maintenance of the animal facilities' physical plant and equipment to assure provision of acceptable operations standards. In addition, veterinary care is provided to ensure the health and well-being of the division's research animals. Research support is provided through training and guidance of animal care technicians and investigative staff in the care and use of research animals procedures for proper performance of surgery, anesthesia, analgesia, and related non-surgical procedures, and protocol development. Research is additionally supported through cooperative efforts with investigative staff to recognize and characterize phenotypic expression of genetic mutations.

Operations and Support Section

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The Operations and Support Section was formed in May 1997. Staffed with subject specialists, the section goal is to provide resources and assistance in the day-to-day activities of the division within the general areas of Resource Management (RM); ESH&Q; and Support Services (SS). Utilizing both full- and part-time appointees, the section focuses on Integrated Safety Management Systems (ISMS) and provides aid and direction to the line organization as they define work and its hazards, analyze the imbedded hazards, develop and implement controls, and perform the work utilizing the determined controls. Section personnel also provide and receive feedback from the ongoing work processes. Section personnel serve as resources and provide guidance/direction in the following representative activities throughout the division structure: *RM* – facility management, property and hazardous material(s) management, space allocation, and management/disposal of both radiological and RCRA/TSCA waste streams; *ESH&Q* – provide biological and division safety officers, promote and assist in up-front evaluations and plans to assure adherence to environmental and radiological codes and regulations, furnish resources guidance in the areas of chemical hygiene and laser safety, and lead a graded approach to the Laboratory's Quality Assurance Program; *SS* – serve as resources in the areas of educational assistance, network and computer support, and required/optional training opportunities. Members of the section are charged with providing assistance to the

division office, laboratory, and field personnel in all areas of compliance and safety and to utilize ISMS principles and core values to promote line involvement in preliminary analyses and formulation of needed safety plans. In specific areas of expertise, they provide leadership and maximum assistance while striving for minimal disruption of ongoing research activities.

Mouse Genetics Research Facility

ORNL established a Mammalian Genetics program soon after World War II specifically to assess the biological effects of ionizing radiations in mammals. Experiments were carried out to determine both rates of induction of germline mutations and differential sensitivities of germ cell stages to induced damage in mice. In more recent experiments, mutagenesis has also been carried out using a wide variety of chemicals, in particular with N-ethyl-N-nitrosourea (ENU), a mouse supermutagen discovered here at ORNL. A new animal facility, now in design stage, will house the ORNL mice in a specific pathogen-free, rather than the current conventional, colony. This colony currently houses about 70,000 live mice that represent about 400 mutant strains; a variety of other strains are being or have been cryopreserved. Most of these mutations, many of them radiation-induced deletions, encompass the seven visible genetic loci that were targets for the risk assessment studies. These loci are agouti (*a*, mouse chromosome 2), brown (*b*, now tyrosinase-related protein 1, mouse chromosome 4), albino (*c*, now tyrosinase, mouse chromosome 7), pink-eyed dilution (*p*, mouse chromosome 7), dilute (*d*, now myosin Va, mouse chromosome 9), short-ear (*se*, now bone-morphogenetic protein 5, mouse chromosome 9), and piebald spotting (*s*, now endothelin receptor B, mouse chromosome 14). We also keep many various inbred and hybrid parental stocks used for experimentation, many other strains that carry coat-color markers for mapping and allelism-testing, and dominant mutations and chromosomal translocations scattered throughout the genome. Ongoing mutagenesis projects involve transgenic technology, including gene knockouts, creation of specifically-targeted deletions, and ectopic or overexpression of transgenes; expertise with these technologies allows us to preselect our gene or chromosomal region chosen for mutation. A database that details available strains and phenotypes is accessible though the Life Sciences Division WWW homepage. Many of the deletion complexes that surround these seven marker loci have been characterized both molecularly and by genetic complementation to determine visible and lethal phenotypes that neighbor the marker locus. In addition, three of the deletion complexes (*p, c,* and *b*) have undergone additional mutagenesis studies, using chemicals that induce point mutations, to create other mutant phenotypes within the deleted regions. Any phenotype can be quickly submapped by crosses to mouse stocks that carry other, overlapping deletions that may or may not complement the mutation. We are testing all these mutants for subtle phenotypes that would not traditionally have been recognized, even by our very experienced technicians who consistently recognize mutations that alter general health, size and morphology, and normal motor behavior. For example, both existing and newly generated mutants are being evaluated for behavioral and biochemical aberrations; we are screening all potential mutants for levels of activity, anxiety, and reaction to novelty, for behavioral despair, for neuromuscular coordination, for learning and memory, and for acoustic startle response. Mice that show abnormalities during any of these tests are analyzed in more detail. We are developing technology to increase the sophistication, efficiency, and throughput for these behavioral assessments. We are also measuring various bioactive molecules or byproducts in blood and urine to monitor mutations induced in biochemical pathways. We welcome other investigators

to come to Oak Ridge to screen potential mutants for their phenotype of interest, or to identify phenotypic changes in their mouse of interest. The MGRF is a Department of Energy User Facility.

Director: Dabney K. Johnson, 423-574-0953, e-mail: k29@ornl.gov

DNA Sequencing Lab

A DNA sequencing and automated genotyping laboratory has been established at ORNL. This laboratory can provide researchers in Life Sciences and other Laboratory divisions with state-of-the-art DNA sequencing and automated fluorescence genotyping. The current facility is housed in approximately 1395 sq. ft. of lab and office space. Sequencing equipment currently consists of 1 ABI 377 sequencing machine (modified for 96 lanes) and 1 ABI 373 sequencing machine (modified for 64 lanes). For template preparation the lab has a Qiagen template robot capable of producing 96 sequence-ready DNA templates in less than 2 hours. Recently, in collaboration with the Robotics and Process Systems Division, we have constructed a robotic line for carrying out DNA sequencing reactions. This line integrates a CRS A465 robotic arm with a Robbins Hydra pipettor (96 well), MJR quad PCR machine, and a refrigerator (with actuator door). Associated with the DNA sequencing facility is a standard molecular biology lab which includes a Beckman Ultra centrifuge L8-80M, BioRad electroporater, 2 New Brunswick air shakers, microfuges, various gel electrophoresis equipment, etc. Computer needs of the facility are taken care of by a group of networked computers including 3 PowerPCs, 7 PCs, and 1 SGI O2 machine.

Contact: Richard J. Mural, 423-576-2938, e-mail: m9l@ornl.gov

Gene Expression Chip Laboratory

A genosensor laboratory has been established at ORNL. This laboratory is dedicated to the development of technology for genome analysis, the support of various applications, and the support of ORNL's functional genomics program. Genosensors take advantage of the specific hybridization properties of nucleic acids to assess the expression level of particular gene sequences or changes in gene coding regions. Such measurements are key to learning gene function. Extensive libraries of DNA sequences can be arrayed to probe test samples in a miniaturized, parallel fashion. The resulting test device is called a genosensor. A cornerstone of our genosensor technology has been an advanced configuration in which the hybridization reactions occur on high surface area substrates, such as channel glass or porous silicon, rather than on conventional flat substrates. The porous substrates provide a unique "flowthrough" architecture that lead to an increased surface area and faster reaction kinetics. A customized

robotic spotting system, based on ink jet dispensing, has been developed to position DNA probes onto the genosensor. Individual probe can be placed at pitches as small as 200 microns. Additionally, instrumentation and protocols for sample preparation, fluid handling, and hybridization detection have been developed. Currently, genosensors are being generated and analyzed for monitoring gene expression profiles in mammalian and bacterial systems, for analyzing polymorphic markers in the human genome, and for bacterial typing of environmental samples.

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Center for Dosimetric Modeling and Computation

In recognition of the Life Sciences Division's capabilities and scientific contributions in the area of human metabolic and biokinetic computational modeling, federal agencies concerned with occupational and public radiation protection formally recognized a "Center for Dosimetric Modeling and Computation" (CDMC) at ORNL. The primary mandate of the CDMC, which consists of staff from the Dosimetry Research Group in the Assessment Technology Section, is to centralize and coordinate computational human modeling capabilities and associated medical information in the United States. Dr. Keith Eckerman, Director of the Center, and the staff of the Dosimetry Research Group have been recognized leaders in the field of human computational modeling for radionuclides and recently served as the International Center for the Development of the ICRP Reference Man, which provided the calculational basis for dosimetric computation.

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Center for Life Cycle Analysis

The Center for Life Cycle Analysis (CLCA) formally opened at ORNL on October 1, 1998. A formal announcement and description of the CLCA appeared in the September 28, 1998, issue of the "Weapons Complex Monitor" and described the mission, history, and objectives of the Center. Dr. Kathy L. Yuracko, Technical Program Leader for Life Cycle Analysis in the Assessment Technology Section, is the Director of the Center. Other key staff of the CLCA include senior technical staff members from other sections with the Life Sciences, Energy, and Environmental Sciences Divisions at ORNL.

The mission of the CLCA is to provide environmentally conscious and cost-effective solutions to environmental concerns such as reindustrialization, recycling, pollution prevention, and decommissioning. Each problem is approached with multi-attribute decision analysis considering the uncertainties and socio-economic impacts as part of the criteria used to facilitate decision-making and determine conclusions. The ORNL life cycle analysis approach leads to the most appropriate selection of a solution that is both understandable and defensible. Details of the CLCA, current activities, and life cycle analysis methods can be found on the Internet at http://ats.ornl.gov/clca.

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Center for Independent Environmental Assessment

In May 1998, the Center for Independent Environmental Assessment (CIEA) was established in the Life Sciences Division at ORNL. The mission of the CIEA is to apply Life Sciences Division resources and experience to provide independent, consistent, and state-of-the-art technical assessments in support of environmental pollutant remedial action. Technical support activities of the Center are aimed at independent designation/inclusion of potentially contaminated sites for remedial action, independent confirmation of cleanup following remedial action, and independent technical oversight and evaluation of all aspects of remedial action operations. The Center consists of staff from the Assessment Technology and Environmental Technology Sections in the Life Sciences Division and has capabilities and experience in hydrology, risk assessment, pollutant detection, geology, indoor air quality, toxicology, pollutant modeling and transport, and regulations. The CIEA also has a full complement of analytical, field survey, and pollutant assessment capabilities to detect, sample, and analyze any type of radiological and non-radiological environmental pollutant.

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Joint Institute for Biological Sciences

UT/ORNL Graduate Program in Genome Science and Technology

Tennessee Mouse Genome Consortium

Joint Institute for Biological Sciences

Much of the progress in biological sciences during the past 20 years can be traced to (1) understanding the structure and function of genes and (2) applying biological processes to engineer organisms, treat disease, and manufacture pharmaceuticals and other materials. During that time, the contributions to these areas of research made by ORNL and UT have benefited people locally, nationally, and worldwide. Also during that time, ORNL and UT have enjoyed a relationship of cooperation. In keeping with that longstanding tradition, ORNL and UT have agreed to establish the Joint Institute for Biological Sciences to promote collaborative R&D.

The Institute will address the biological needs of the future by meeting the following objectives:

- obtain public and private funding;
- combine the areas of strength and merge the R&D currently under way at both institutions;
- help and advise state, regional, and national organizations;
- offer R&D support for private industry;
- offer education, training, and on-the-job experience for students, medical personnel, and policymakers; and;
- devise strategies to finance
    - construction of needed research facilities,
    - acquisition of state-of-the art equipment, and
    - appointments of collaborating-scientist positions;

The Joint Institute will be developed in phases. The first phase will involve programs already in existence at ORNL and UT, which include a graduate program in biological sciences as well as programs in functional genomics, computational biology, and bioinformatics. The second phase will involve developing areas of research that include forensic sciences, biomimetics and biomaterials, and biomedical technologies.

Phase 1

Graduate and Postdoctoral Education:
ORNL and UT have a 30-year history of working cooperatively on graduate education through the UT-ORNL Graduate School of Biomedical Sciences. That program is undergoing a major revision that will culminate in a shift in focus toward the disciplines of functional genomics, structural biology, and bioinformatics/computational biology. Educational activities will also involve undergraduate students, who will be encouraged to pursue advanced studies.

Functional Genomics:
Until recently, genetic research has been limited to studying the function of individual genes. Developments within multiple disciplines have enabled researchers to begin pursuing functional genomics, in which gene function is studied on the genome scale. The ORNL Laboratory for Comparative and Functional Genomics will be the focal point for multidisciplinary functional genomics research within the Institute.

Bioinformatics and Computational Biology:
Mathematics and computational science will play a key role in biological and environmental research at the Institute. Emphasis will be placed on education and training. In addition, researchers and engineers from a number of disciplines will collaborate at to meet the following challenges:

- computational infrastructure,
- prediction of macromolecular structure and function
- cell biology
- genomic computation,
- biomechanics, and
- neuroscience.

Phase 2
As first-phase goals are met, new areas of research will be pursued at the Institute. The following disciplines have been identified as phase-2 goals:

- forensic sciences
- biomimetics and biomaterials
- biomedical technologies

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UT/ORNL Graduate Program in Genome Science and Technology

The University of Tennessee and Oak Ridge National Laboratory have teamed during 1998 to restructure the former Oak Ridge Graduate School of Biomedical Sciences to form a graduate program with emphases in mammalian genomics, structural biology, proteomics, computational biology and bioinformatics, and bioanalytical technologies. Students will be trained in emerging areas of the genomic sciences and upon completion of the program will be qualified to join the competitive work force in academics, government laboratories, and private industry such as pharmaceuticals or other technologies. To this end, the program will provide a firm foundation in genetics, molecular and cellular biology, biochemistry and computing, and specialty training in applications of these sciences to functional genomics.

The program takes advantage of interactivity and collaboration among scientists and faculty from both the University of Tennessee Knoxville and Oak Ridge National Laboratory in conjunction with the Joint Institute of Biological Sciences. Faculty from both campuses will offer courses. Research opportunities are available on both campuses; research projects will be mentored by a faculty member from each campus. Students are encouraged to develop research projects at the interfaces of the emphasis areas.

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Tennessee Mouse Genome Consortium

On December 3, 1998, ORNL signed a memorandum of cooperation with a number of the state's medical institutions. The memorandum, called Tennessee Mouse Genome Consortium, is designed to help medical researchers collaborate in applying ORNL's mouse colony resources to their studies. Participants with ORNL in the venture are the University of Tennessee (Knoxville and Memphis), Meharry Medical College, Vanderbilt University Medical Center, and St. Jude Children's Research Hospital. The signing was part of a conference in Knoxville, "The Impact of Emerging Technologies on Health Care in the 21st Century," that included a presentation by MGDS's Dabney Johnson and featured Tennessee Senator Bill Frist as the keynote speaker. The increased research collaboration throughout the state, using the mutations in the Lab's mouse colony, will bring important findings in genetic medical research

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Center for Biological Sciences

Functional Genomics and Proteomics

Structural Biology

Biomedical Engineering

Technology Applications

Center for Biological Sciences

DOE-OBER is planning for a significant investment in a new Center for Biological Sciences (CBS) at ORNL during the FY 2001–FY 2004 period. The CBS is planned as a modular complex of buildings, equipment, and infrastructure that will house current and future research programs in the areas of functional genomics, structural biology, proteomics, and systems biology. It will provide the environment for the ORNL biological research program to make significant contributions to biology during the next decade and beyond, with a special focus on complex biological systems research. Development of the CBS will enhance the advantages gained from the program's recent restructuring to embrace not only the biological sciences but also allied disciplines in information science and computing, analytical methodologies, and chemistry. The table below provides funding projections for the CBS.

The first phase in the development of the CBS is the construction of a Laboratory for Comparative and Functional Genomics (LCFG), at an estimated cost of $12 million, to house the MGRF. The LCFG will replace an aging building at the Oak Ridge Y-12 Plant that is no longer adequate to house one of ORNL's premier research facilities. In addition to housing the mouse colony, the LCFG will include laboratories with special phenotype screening and cryopreservation capabilities.

The CBS will also encompass a proposed Center for Structural Molecular Biology (CSMB), a user facility that will integrate ORNL's unique capabilities in neutron science, as represented by the HFIR and the Spallation Neutron Source (SNS), with strong programs in mass spectrometry and computational biology. The SNS beam line identified in the table is the principal new capital resource needed to support the CSMB beyond 2003.

Capital Funding Projections for ORNL Center for Biological Sciences by fiscal year
(in millions of dollars)

	2001	2002	2003	2004
Laboratory for Comparative and Functional Genomics	8	4	0	0
Structural biology beam line for the Spallation Neutron Source	0	0	3	3
Computational biology and bioinformatics	2	3	0	0
Proteomics	3	5	2	0
Instrumentation	2	1	1	1
Total	15	13	6	4

Laboratory resources in bioinformatics and computational biology will add to the scientific stature of the CBS. Efforts in these areas link the functional and structural biology components and also support the development of new efforts in systems biology envisioned as part of the CBS. The CBS will provide space and "connectivity" (computing and information technology infrastructure) for both the bioinformatics and computational biology

researchers and the experimental biologists. The leverage gained through this combination of expertise and infrastructure will also provide the tools for use of the CBS facilities as a virtual laboratory by research partners at other institutions.

Research programs at the CBS will encompass ORNL's important efforts in protein biochemistry, which were recognized in 1998 with the election of a senior staff member to the National Academy of Sciences. The CBS will provide the physical environment for integrating these efforts into ORNL's biological research program and bringing them to bear them on the broader charge of proteomics.

Future biological research at ORNL will be aggressively directed to take advantage of advances not only in computational biology but also in instrumentation and measurement sciences and technology. Facilities at the CBS will co-locate bioinstrumentation and bioengineering R&D efforts with the new biological research programs. These programs will build strong alliances with other biological and medical research centers, building on the resources of the Joint Institute for Biological Sciences.

Functional Genomics and Proteomics

Recently announced plans for accelerating the sequencing of the human genome call for a first draft of the reference human genome to be completed within the next year. This will provide the biomedical research community with a computerized catalog of the names, locations, and nucleotide sequences of the 80,000 to 100,000 genes on the human chromosomes. Given the rate at which sequence data are being produced, there is the potential for discovering hundreds of new human genes every day. In addition, intensive efforts are under way to sequence the genomes of important pathogenic and environmentally and commercially significant microorganisms. Increasing focus is also being placed on sequencing plant genomes, with obvious implications for agricultural crops. Several of these smaller genomes have been completely sequenced.

As these various genomes are completed, significant advances in the ability to determine the function of genes, within and across genomes, will be required to unlock the information contained in the output from sequencing and gene searches. Biologists have been studying gene function for many years, but most of their research has been slow, costly, and directed at single genes. Access to the powerful reagents from the genome program is changing this situation. In the new era of biomedical research that has just begun, it will be possible to perform experiments in functional genomics—that is, to determine the function of genes and systems of genes on a genome-wide scale.

Gene function is determined (1) by analyzing the effects of DNA mutations in genes on normal development and health in the whole organism; (2) by analyzing a variety of signals encoded in the DNA sequence; and (3) by studying the proteins produced by a gene or system of related genes. Researchers are able to study functional genomics in humans by using genome information from other model organisms that provide rich scenarios for experimental research. The mouse, with its genetic and physiological similarities to the human and its extensive comparative genetic linkage map, is one of the leading model organisms for determining human gene function. A wide variety of genetic and molecular manipulations are possible in the mouse, making it a powerful research organism for studies of functional genomics. In addition, the availability of completed DNA sequences for plants and microbes opens opportunities to work on gene networks and gene interactions in systems where all the genes are known. Work on other model organisms also opens related research areas that are important to DOE, such as the identification of organisms in the environment and the genetic manipulation of organisms to help mitigate environmental problems.

The availability of complete DNA sequences for many organisms in the near future will enable whole new lines of scientific inquiry into the nature of the proteome, the proteins encoded by the genome. Thus, an important aspect of determining gene function is the characterization of the vast number of proteins expressed by the genome, including establishing both the structure of a particular protein and its role organism. Proteomics research programs are being planned by the DOE and other agencies. Efforts are under way to perform high-throughput assays to determine the structures of proteins and study protein

complexes using x-ray crystallography, NMR spectroscopy, mass spectrometry, neutron scattering techniques, and computational tools.

At ORNL, we have initiated a program that combines unique strengths of existing research programs in mouse mutagenesis with analytical technologies and computational biology/bioinformatics to address critical issues in Functional Genomics and Proteomics. Our approach is based on the conviction that genetics and protein studies should be viewed as integral components of an overall strategy to understand protein function in the context of the whole organism and to define this function at the molecular level. The ORNL effort builds on synergism between the existing Mouse Genetics and Mutagenesis Core effort, the Computational Biology/Bioinformatics Program, and the proposed Center for Structural Molecular Biology. This approach will maximize our ability (1) to assign both biochemical and organismal function to genes and proteins, (2) to define interacting protein pathways at the molecular level, and (3) to establish the role of proteins in the whole organism. The investment of Laboratory Directed R&D (LDRD) funds in this program from FY 1997 through FY 1999 has served to catalyze cross-disciplinary research projects involving biologists, chemists, engineers, physicists, and computer scientists, to develop tools required for mounting a highly efficient, comprehensive system for functional genomics and proteomics. This team brings new approaches to bear on the scientific issues of enriching raw DNA sequence generated at the DOE Joint Genome Institute (JGI) and elsewhere, with functional information derived from gene expression and protein studies of mutations in the mouse. Specifically, we are combining advanced methods in mouse mutagenesis with the development of new functional genomics and proteomics technologies, both analytical and computational, to dissect and understand how gene expression impacts specific biological systems. This program also applies these new technologies to study important bacterial and plant systems.

A key component of our Functional Genomics and Proteomics Program is the MGRF, a DOE national user facility, which is an unparalleled resource for functional genomics. The MGRF represents one of the largest facilities in the world for carrying out experimental research in functional genomics using the mouse as a model organism. Mouse geneticists can "target" a specific gene to eliminate or alter its function in the whole animal or only in a specific cell population, or they can add normal genes back to a mutant mouse to correct an abnormality. They can engineer rearrangements in large regions of the genome and then create gene-by-gene mutations in these regions using the chemical mutagen ethylnitrosourea (ENU) to make single-base changes in DNA. ENU is useful for making multiple different mutant forms of a single gene, thereby providing more exact human disease models that mimic the subtle genetic variations characteristic of human populations. These strategies for creating mutations in mice can easily be expanded to a genome-wide scale, generating genetic reagents essential for the entire research community.

Outlined below are examples of how we are melding our advanced technologies and computational biology capabilities with our mouse mutation resource for the purpose of

establishing highly efficient techniques for defining specific functions of proteins in mutation models.

1. **Gene expression and protein analysis techniques for augmenting primary phenotype screening and secondary/tertiary analyses of mutant phenotypes.** Phenotype screening is both a huge undertaking and a commitment that is well suited for a national laboratory resource. The Mouse Genetics and Mutagenesis Core effort is focused on recovering phenotype-defined mutations in selected regions of the genome. Using chemically induced mutations (e.g., ENU), a sufficient number of potentially mutant animals (and carrier siblings) will be produced, allowing us to identify mutations affecting a wide variety of biological pathways. These mutants will be identified with our in-house phenotype-screening protocols (the "Screenotype" system). Additional screens will be provided by distribution of these animals to our collaborators in the Tennessee Mouse Genome Consortium, which at present includes Vanderbilt University Medical Center, Meharry Medical College, St. Jude Children's Research Hospital, and the University of Tennessee (Knoxville and Memphis). As part of this effort, we will incorporate automated, high throughput phenotype screening techniques to expand our phenotype-screening net to identify subtle physiological phenotypes. For example, we have developed a micro CAT (computerized aided tomography) device for rapidly screening mice for organ and skeletal changes. We have also developed microfluidic devices ("lab-on-a-chip") for a number of analytical processes employed in the molecular biology laboratory, such as sample purification, PCR amplification reactions, electrophoretic separations, and others. We are developing mass spectrometry-based techniques for monitoring targeted proteins, such as expression of cytokines as sentinels for mutations leading to chronic inflammatory disorders. These new technologies, as well as others being developed at ORNL and in other laboratories, represent a vital component in our strategy to meet the requirements of a large-scale proteomics effort.

2. **Technologies that facilitate genetic linkage analyses in large-scale mouse crosses for genetic dissection of complex biological pathways.** Currently, we have the capability to induce and discover modifiable mutations, as well as their modifiers; however, to conduct whole-genome screening for linkage using simple-sequence repeat (SSR) markers to identify the involved genes and proteins requires new, efficient analytical tools. We will apply our established methods in mass spectrometry (based on matrix-assisted laser desorption techniques) to accomplish rapid, gel-less analyses of SSR PCR products for high-throughput linkage analyses required in studies of modifier mutations and of meiotic recombination. Other complementary technologies are also being developed, including novel hybridization chips and "lab-on-a-chip" microfluidic devices for combined PCR/electrophoresis/detection of DNA fragments.

3. ***In vitro* and whole-animal approaches for complex pathway analysis.** In a current LDRD project, we are focusing on how to best approach the global analysis of a complex system, which promotes organ-directed, whole-organism phenotyping of

genes/proteins/mutations. We are investigating a new means for screening for recessive mutations *in vitro* in embryonic stem (ES) cells that will allow us to focus on genes affecting complex pathways and which are likely to affect phenotypes of target organs. As an initial test system, we are examining skin differentiation in ES cells. Skin has been selected as a target organ because it is involved in developmental, cancer, aging, and exposure biology, and ES cells can be induced to differentiate into skin *in vitro*. As part of this endeavor, we will incorporate chip-based mRNA expression profiling technologies (which can screen for expression of genes involved in skin development, as well as other cellular processes, i.e., cell cycle, apoptosis, and others to define skin pathway perturbations induced by both existing and newly induced mutations. Technologies developed as part of this work will be readily applied to other test systems.

4. **New techniques for high-throughput detection of variants of specific proteins that can then be funneled into both genetic (organismal) and structural (biophysical) analyses.** We will develop high-throughput mass spectrometry-based procedures to detect, in one-generation chemical mutagenesis screens, partially functional variants of proteins. The mutant protein identified from this "Protein Variant Screen (PVS)" would then direct the matings of variant mice to reveal both dominant and recessive whole-organism, functional phenotype(s). Such new technologies should have the sensitivity to detect heritable mutations in protein processing, as well as abnormalities in protein primary and secondary structure. Such a simple, one-generation test could easily be piggybacked onto ongoing ethylnitrosourea experiments with little additional mouse costs, in contrast to the rather substantial costs that might be incurred if one were to modify protein structure blindly, one residue at a time, by modifying loci *in vitro* in ES cells. Furthermore, we would specifically assay for protein polymorphisms, not knockouts; indeed, the knock-out mutation leaves the structural biologist no material to study. As one example, the MLH1 protein, involved in DNA repair, is required for recombination and the successful completion of meiosis. Male animals homozygous for knockout mutations in this gene are sterile because meiosis is arrested; thus, an allelic series of mutations would be highly desirable to ascertain whether variants (not nulls) of this protein have an effect on sterility, nondisjunction, DNA repair, and mutation rate. The developed technologies would be broadly applicable to other biological issues. For instance, it may be possible to induce a series of slightly malformed estrogen receptors in whole animals that could then be tested for interaction with xenobiotic estrogens *in vitro* while at the same time tested for cancer susceptibility in the whole animal. We feel that the uses for this particular marriage between classical germline chemical mutagenesis and mass spectrometry are far-ranging.

5. **Structural characterization of mutant proteins with phenotypic ramifications and comparison with wild type for determination of structure/function relationship.** Using techniques of structural biology, we will analyze protein variants from a phenotypically characterized allelic series of chemically induced mutations. An important issue in functional genomics/proteomics is establishing the structure and effects

of the many types of post-translational modifications that can occur in expressed proteins. State-of-the-art structural techniques will be used to characterize modified proteins at the molecular level and identify differences in their interactions with other key biomolecules. We will employ techniques such as existing resources at ORNL in mass spectrometry and the proposed CSMB facility for small angle neutron scattering, as well as structural techniques available at our collaborating national laboratories, including synchrotron-based protein crystallography and nuclear magnetic resonance. We will also draw upon ORNL's expertise in computational biology to help establish protein structure via threading and other techniques.

6. **Validating predictions of protein structure and function through mouse genetics and mutagenesis.** Computational techniques in genomics and molecular biology generate predictions of gene and protein structure and function that may, in turn, generate hypotheses that can be tested both *in vitro* and *in vivo*. For example, bioinformatics techniques might suggest a function for a newly identified protein by assigning it to a family of proteins that share similar motifs and functional domains. Starting from this prediction, one would like to understand the function(s) of this protein both at the level of molecular mechanisms and its role(s) in the organism. As more and more genomic DNA sequence becomes available from the JGI and other sequencing centers, mouse genetics and mutagenesis, combined with computational analysis, will become a powerful tool for understanding the bases of gene and protein function. There are a number of levels where this can occur. In regions being targeted for mutagenesis, computational analysis of the DNA sequence of the region will suggest possible correlations between genes identified in the region and the phenotypes observed. Computational analysis can also help in identifying candidate genes in regions with known mutations by making structural and functional predictions. These predictions can then be tested by targeted mutagenesis methods. Another role for computational sequence analysis will be to determine the gene content of regions covered by "draft" sequencing to aid in the selections of regions as targets for various mutagenesis approaches. The results of mouse mutagenesis will also provide useful feedback for refining the techniques and approaches used in computational biology to predict gene and protein structure and function.

In summary, our goal is to understand protein function in the context of the whole animal and to define this function at the molecular level by combining advanced methods in mouse mutagenesis with the development of new concepts for functional genomics and proteomics technologies. Although the focus of this effort is not related to the field of drug discovery, the developed tools would certainly be applicable to this area as well. We will work with other national laboratories, in particular, to complement their related Functional Genomics/ Proteomics programs, making ORNL resources and technologies available to them. We will also form new collaborations and strengthen existing collaborations with and serve as a resource to laboratories at other national laboratories and in academia and industry. An April 1998 conference, "Partnering for Functional Genomics Research," attracted representatives from 14 pharmaceutical and biotechnology companies. All participating companies expressed

interest in further interactions, and several new projects are being discussed. The Merck Genome Research Institute initiated a research project through the Joint Institute for Biological Sciences. Other follow-on activities are under way to establish collaborative efforts and to pursue the development of an R&D consortium involving several industry partners. As with all actively growing research programs, new directions become apparent which require change; however the general models outlined above give an overview of the type of program we are building and the types of important and relevant information that will be obtained.

Structural Biology

The proposed Center for Structural Molecular Biology (CSMB) is intended to bring together the existing strengths at ORNL in neutron sciences, mass spectrometry, and computational biology and make them available to a broad user community in the biological sciences. The cornerstone of the CSMB is a small angle neutron scattering (SANS) facility to be constructed at the HFIR at ORNL. SANS is an important tool for studying molecular conformations and molecular interactions. It provides insight into the molecular basis of communication pathways that achieve coordinated function by identifying specific chemical groups that interact with the environment and with molecular networks involved in binding and activation sequences. It provides information on the dynamics of a biomolecule in solution and complements the high-resolution structural x-ray crystallographic data obtained from a static, crystalline molecule. SANS will be a key tool for understanding the cellular level communication that is the basis for protein and, thus, gene function.

Establishing the CSMB at this time is particularly critical because we can take advantage of a recently initiated upgrade at the HFIR. As part of this upgrade, the "brightest" long-wavelength neutron source in the U.S. is being constructed. During this upgrade, we have the opportunity to design and build a SANS instrument (and associated resources) specifically designed for the study of biological systems. This instrument will incorporate both high flux and a large area ($1m^2$) detector to collect data over a wider solid angle to enhance the study of biological molecules. The resulting facility will provide the biological community in the U.S. with state-of-the-art capabilities in SANS, which will rival the world's best biological facilities at the Institut Laue Langevin (ILL) in France.

In addition to the SANS facility, we will incorporate well-established biological mass spectrometry and computational resources into the CSMB, providing the biological community with additional tools that would complement structural information obtained from SANS. As an example, it has been shown that modifications to proteins can effect both the structure and function of these biomolecules (e.g., Trewhella and co-workers, *Biochem.* **28**, 2220-2228, 1989). Mass spectrometry can provide information on both the extent of these modifications and the sites of attachment. Computational modeling can support conformational changes observed in SANS data. In addition, for uncharacterized proteins, computational methods can be used to identify fold families and build models from related known proteins prior to SANS analysis. Capabilities within the CSMB would also complement resources at other structural biology facilities, such as synchrotron x-ray crystallography centers, to provide a more thorough picture of the structure of biological molecules and their interactions in complex systems. The proposed CSMB would provide structural capabilities to programs within the DOE community, and to other government, academic, and industrial laboratories. An advisory panel of distinguished scientists has been established to provide guidance to the Director and staff of the CSMB in the establishment of the center. A CSMB User Group consisting of potential users of the center will be created to

give advice on equipment and capabilities to be included in the CSMB and to establish guidelines for the operation of the Center. An important aspect of the CSMB will be the training and education of students and scientists in the technologies within the CSMB. A wide range of opportunities for scientists and students working in the field of structural biology will be provided, including extended visits for experimental work, short courses, workshops, and scientific meetings.

Specific Features of the CSMB

- SANS facilities to be built at the upgraded HFIR will be specifically designed for high flux and located as far away as possible from other instruments to achieve the low background required for biological studies. Adjacent laboratory facilities will be available for final preparation of samples. Data acquisition/reduction capabilities will be integrated into instrument. ORNL staff will be available to support users.
- Additional existing neutron-based tools at HFIR will also be made available to the CSMB users, including another SANS instrument designed for studying materials with higher resolution and a reflectometer that can be used to study biomolecular monolayers and thin films. A small angle x-ray scattering (SAXS) instrument is also available at ORNL, which can be used to evaluate biological samples prior to SANS experiments.
- Existing resources in biological mass spectrometry will be made available to the users of the CSMB, including two Fourier transform in cyclotron resonance mass spectrometers and a number of other instruments equipped with electrospray and matrix assisted laser desorption sources. Dedicated staff will support users.
- Existing resources in computational biology/informatics will be made accessible to the users of the CSMB for modeling, prediction, and data base use, with dedicated staff to support users.
- Sample preparation facilities to support SANS and MS experiments will be maintained with dedicated staff.
- CSMB users will have access to the Joint Institute for Neutron Sciences (JINS) facility being built at ORNL during their visits. The JINS will include overnight accommodations, food facilities, offices, meeting space, etc.

Benefits to Structural Biology User Community

The proposed Center fills an important niche in the spectrum of scientific tools required to perform comprehensive structure – function experiments. It is designed with specific interfaces to the neutron crystallography center at LANL so as to jointly serve and grow the structural biology community that takes advantage of the unique features of neutron sources. It is unique in its combination of high-flux cold neutrons for SANS with a world-class computational biology resource, and pioneering mass spectrometry facility.

Biomedical Engineering

Biomedical science and technology is a vitally important R&D area for the nation, involving immense human, sociological, and economic consequences. Although this broad subject could encompass a vast array of disciplines and topics, we have focussed our efforts on the more narrow description used by the Medical Sciences Division at DOE-OBER as follows: "Medical devices, instrumentation, technology (including computational), or new methodologies that have a medical application. These could be used in medical diagnostics, monitoring, treatment, or patient rehabilitation."

The Life Sciences Division has core expertise in several emerging biotechnology areas including biomedical mass spectrometry, biosensors, nuclear medecine, medical telesensors, biochips, and bioinformatics. Complementary efforts in other divisions include medical imaging (I&C), biomaterials (Metals and Ceramics), and various bioanalytical techniques (CASD). Medical expertise is added by teaming with clinical researchers in collaboration with the UT Medical Center, Vanderbilt Medical Center and The Meharry Medical Center. All of these focus areas are extremely multidisciplinary and require a team approach including biologists, chemists, physicists, engineers, and medical doctors.

Building on these core, interdisciplinary competencies and our alliances within and outside ORNL, we have developed an intitiative in Biomedical Science and Technology that is expected to expand our current effort of about $4 million to over $10 million in the next five years. This initiative is designed to meet the growing needs of federal sponsors such as DOE, NIH, and DOD. It also is synergistically related to other division priorities such as functional genomics, proteomics, and instrument development.

In the current reporting period the following accomplishments have provided the framework for the initiative:

- Summary of current capabilities and projects; development of strategic plan for the future.
- Contacts/collaborations with neighboring medical centers—UT, Vanderbilt, Meharry, etc.
- Contacts/collaborations with neighboring Biomedical Engineering Departments—UT, Virginia Commonwealth University, Vanderbilt, Duke, etc.
- Participation in and founding member of the Tennessee Biotechnology Association.
- Sponsor, Planning Committee Member, and participation in the Annual Tennessee Conference on Biomedical Engineering (Vanderbilt, 1999 ; Knoxville, 2000).
- Sponsor, Planning Committee Member, and participation in the symposium on "The Impact of Emerging Technologies on Health Care in the 21st Century" (Knoxville, 1998).

- Planning Committee and participation in the "Wireless Medical Conference" (Nashville, 1999).

Technology Applications

The role that the Life Sciences Division plays in applying Laboratory-developed methods to solve problems of national concern is well recognized throughout the environmental and medical communities. For many years, the Division (or its predecessors) has been a leader in applying technologies, developing instruments, and formulating new approahes for dealing with environmental and medical problems that were beyond the technical scope of those that could be addressed by other federal or private organizations. To more effectively focus the Division's efforts in applying technologies, marketing capabilities, and ensuring cost-effective methods to solve national problems in these areas, a Technology Applications Program (TAP) has been initiated. The TAP consists of a "virtual" organization which includes the Assessment Technology, Environmental Technology, and Toxicology and Risk Assessment Sections and a Program Development Group that consists of recognized technical leaders in each section charged with determining programmatic needs and directions, marketing focus and methods, and long-range planning strategies. Initial efforts of the TAP will be aimed at environmental problems and will encompass pollutant detection and measurement, human health and ecological risk assessment, dosimetry and transport modeling, toxicology, life cycle analysis, laboratory analysis of samples, data management and computer applications, systems integration, and project management. This broad scope of capabilities covers the entire range of technical needs that could be required to address any environmental problem. Cooperative program development efforts are currently being conducted by the Program Development Group, and TAP management is evaluating financial structures and options to ensure cost-effective and efficient operation. The objective of this effort is to provide a model for structuring and strengthening applied programs at ORNL.

Appendices

Division Demographics

Budget

Open Literature Publications

ORNL and Miscellaneous Reports

Presentations

Patents

Invention Disclosures

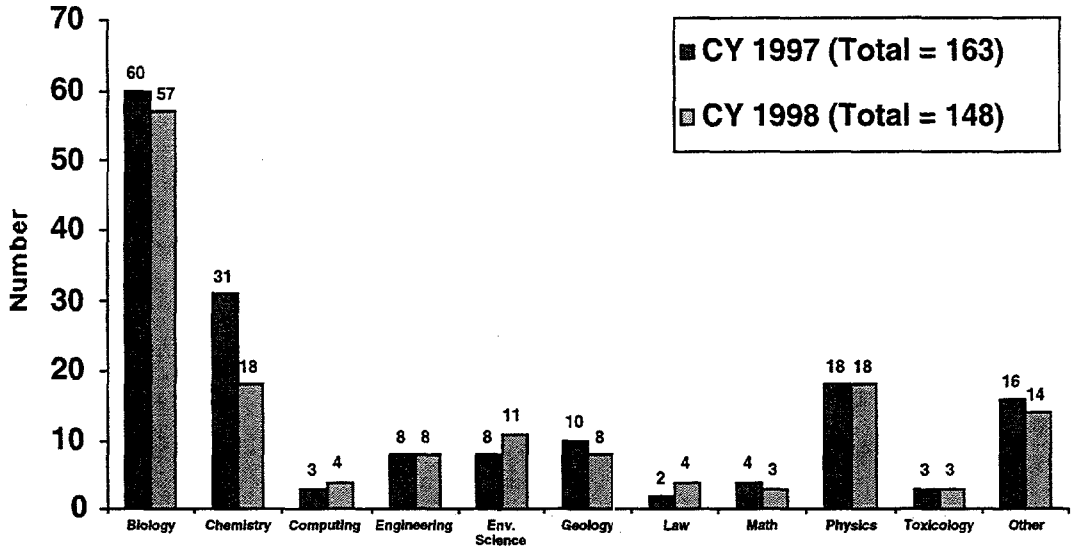
Staff Honors, Awards, External Appointments, and Conference Participation

Advisory Committee

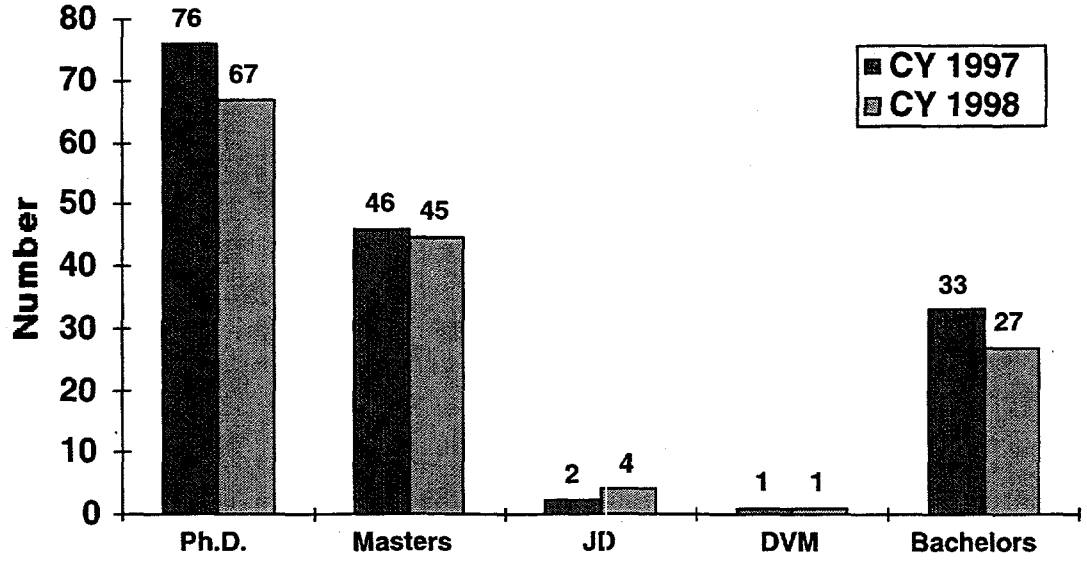
Organization Chart

Division Demographics

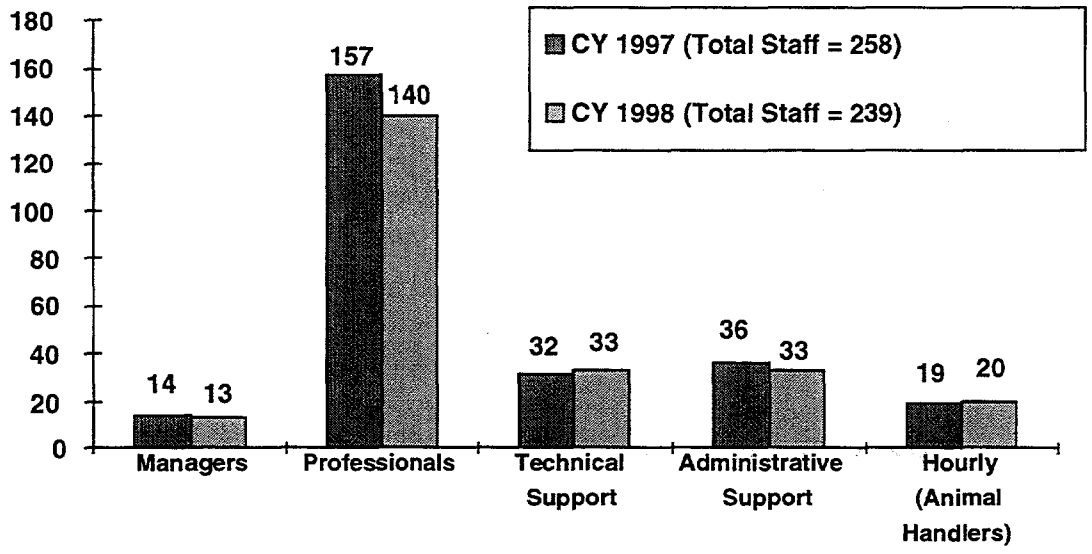
Professional Staff by Discipline



Professional Staff by Degree



Division Staff by Type



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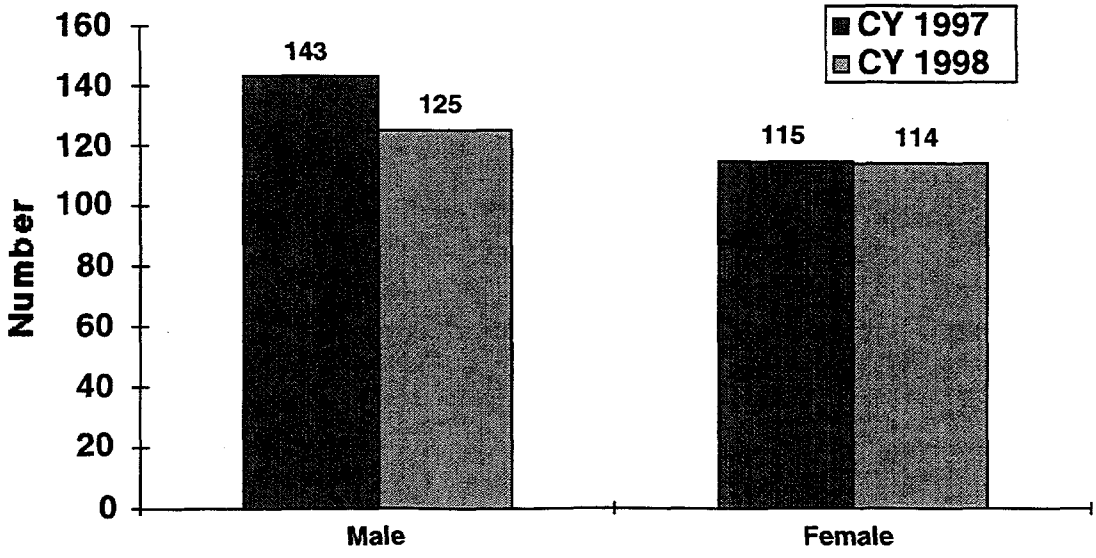
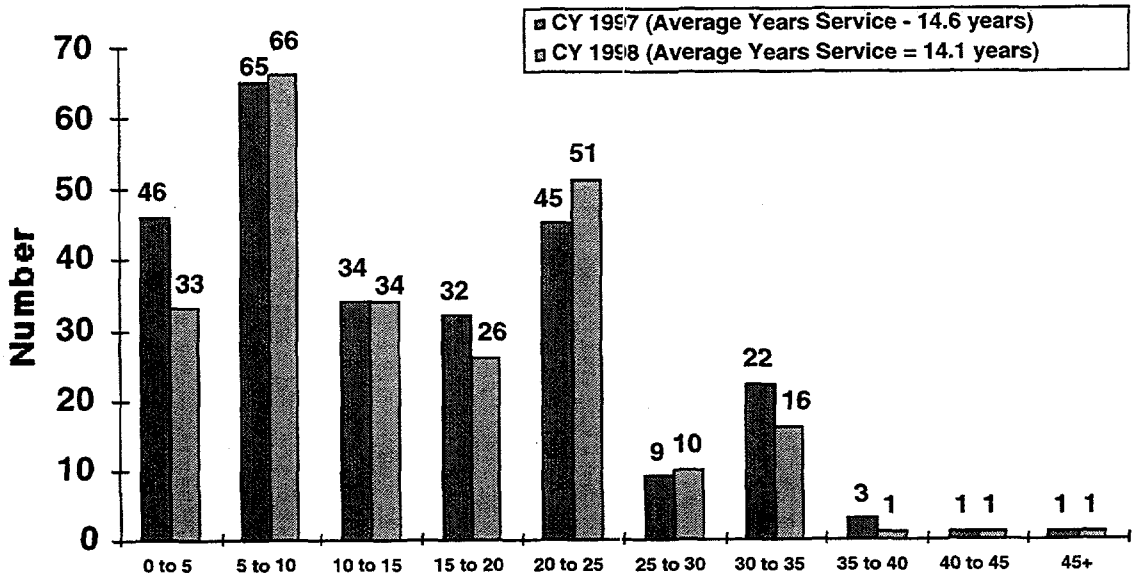


Division by Years of Service



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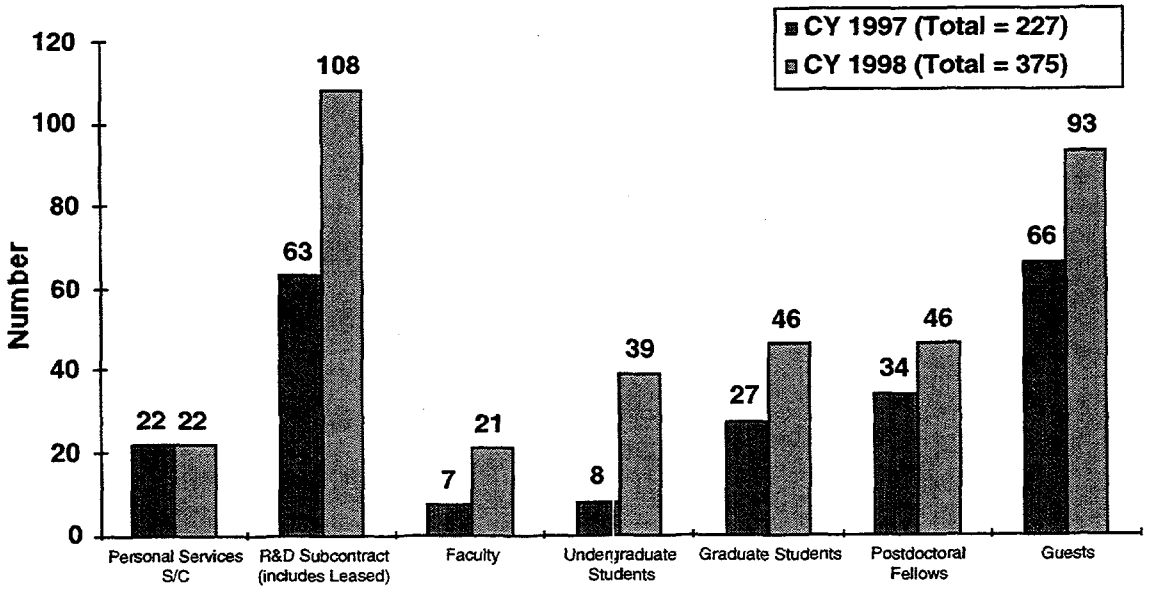
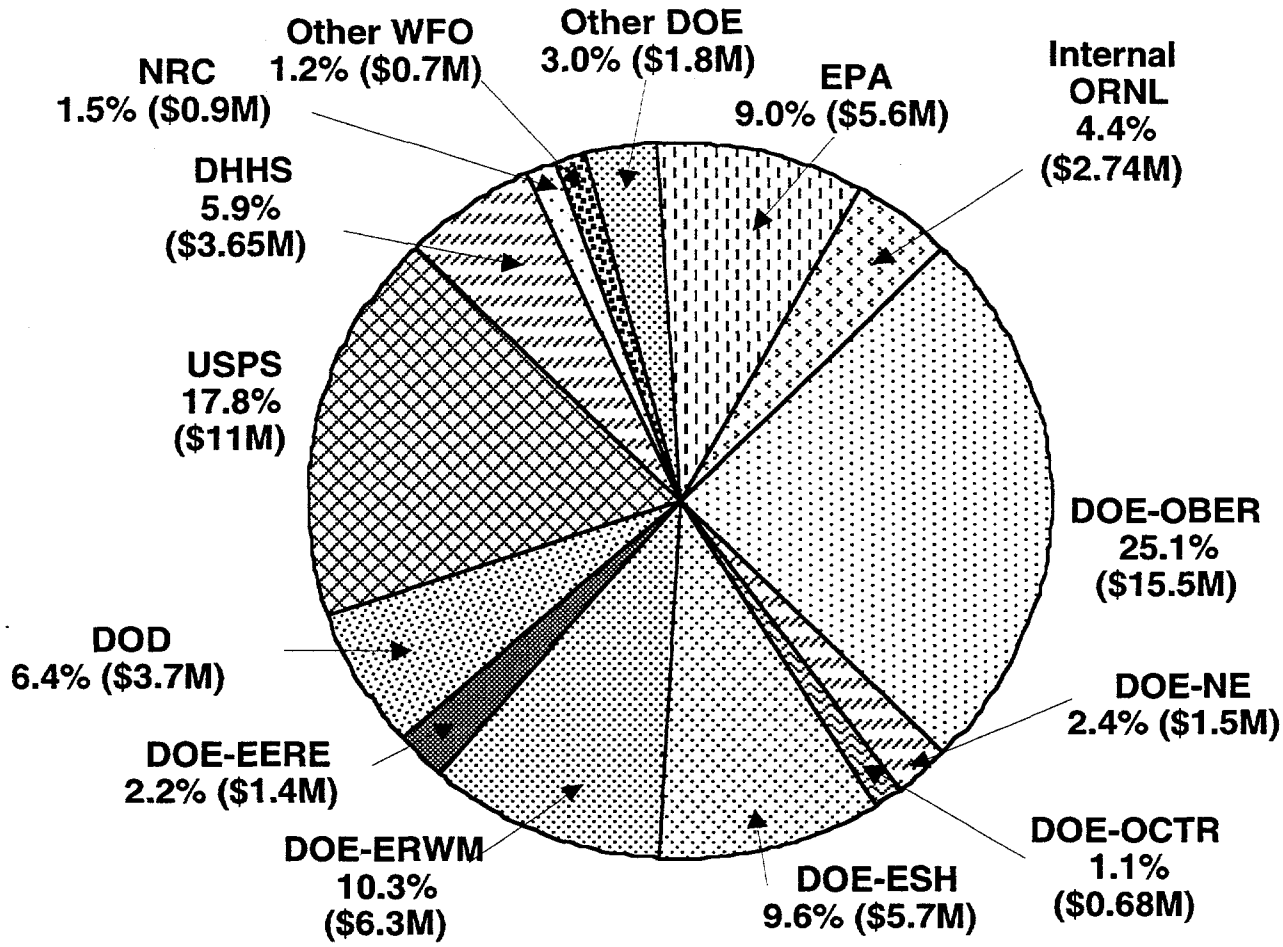
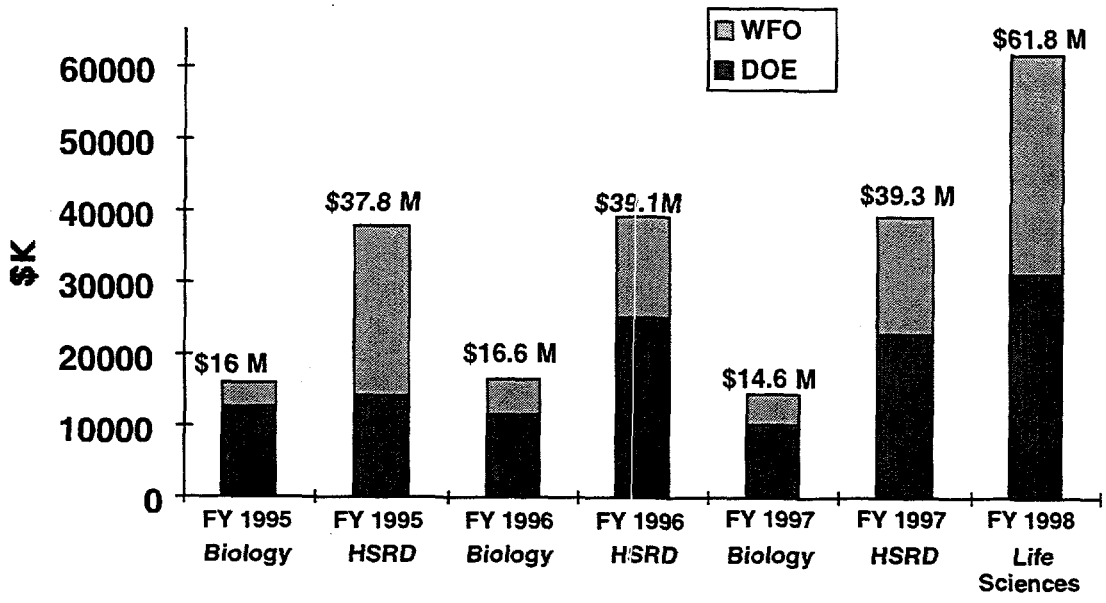


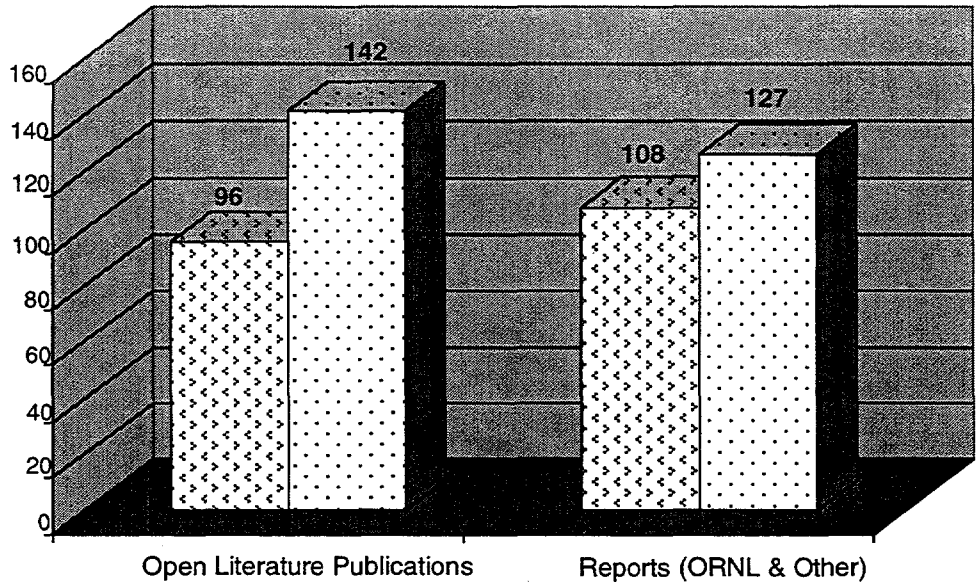
Division Budget — Major Funding Source, FY 1998



Division Budget — History



Division Publications



1997	1998
Total Publications = 204	Total Publications = 269
Publications per S&T = 1.34	Publications per S&T = 1.76

Open Literature Publications, CY 1997–1998

Adams, V., M. Bennett, L. Bishop, K. Deacon, T. Mims, R. Sheely, C. Johnson, K. L. Yuracko, P. Selby, G. Kerr, M. Gresalfi, and C. Goddard, "U.S. Department of Energy National Center of Excellence for Metals Recycle," in *Proceedings of Spectrum '98, International Conference on Decommissioning and Decontamination and on Nuclear and Hazardous Waste Management, Denver, Colorado*, American Nuclear Society, Inc., La Grange Park, IL, pp. 39-46 (1998).

Alberto, R., R. Schibli, U. Abram, A. Egli, F. F. Knapp, Jr., and P. A. Schubiger, "Potential of the Organometallic "$[M(CO)_3]^+$" (M = Re, Tc) Fragment for the Labeling of Proteins and Small Molecules," *Radiochimica Acta* **79**(2), 145-49 (1997).

Allison, D. P., M. J. Doktycz, P. R. Hoyt, T. Thundat, and R. J. Warmack, "The Analysis of Genomes by Atomic Force Microscopy," *Scanning* **19**, 136-37 (1997).

Allison, D. P., P. S. Kerper, M. J. Doktycz, T. Thundat, P. Modrich, F. W. Larimer, D. K. Johnson, P. R. Hoyt, M. L. Mucenski, and R. J. Warmack, "Mapping Individual Cosmid DNAs by Direct AFM Imaging," *Genomics* **41**(3), 379-84 (1997).

Allison, D. P., T. Thundat, and R. J. Warmack, "Scanning Probe Microsopy in Genomic Research," in *Automated Technologies for Genome Characterization*, ed. T. J. Beugelsdijk. Wiley Publishers, New York, pp. 167-88 (1997).

Arakawa, E. T., P. S. Tuminello, B. N. Khare, and M. E. Milham, "Optical Properties of Horseradish Peroxidase from 0.13 to 2.5 Microns," *Biospectroscopy* **3**(1), 73-80 (1997).

Arlinghaus, H. F., M. N. Kwoka, and K. B. Jacobson, "Analysis of Biosensor Chips for Identification of Nucleic Acids," *Anal. Chem.* **69**, 3747-53 (1997).

Arlinghaus, H. F., M. N. Kwoka, X.-Q. Guo, and K. B. Jacobson, "Multiplexed DNA Sequencing and Diagnostics by Hybridization with Enriched Stable Isotope Labels," *Anal. Chem.* **69**, 1510-17 (1997).

Basavarju, S. R. and T. D. Jones, "Atherosclerotic Risks from Chemicals: Part I. A Review of Toxicological Observations," *Arch. Environ. Contam. Tox.* **35**, 152-64 (1998).

Beattie, K. L., "Analytical Microsystems: Emerging Technologies for Environmental Biomonitoring," in *Biotechnology in the Sustainable Environment*, ed. G. S. Sayler. Plenum Publishing Corp., New York, pp. 249-60 (1997).

Bein, K., M. Husain, J. A. Ware, L. Mucenski, R. D. Rosenberg, and M. Simons, "c-Myb Function in Fibroblasts," *J. Cell Physiol.* **173**, 319-26 (1997).

Bergstron, K. A., C. Halldin, J. Hiltunen, C.-G. Swahn, H. Ito, N. Ginovart, H. Hall, D.W. McPherson, F. F. Knapp, Jr., S. Larsson, P.-O. Schnell, and L. Farde, "^{125}I and ^{123}I Labelled (e)-(-,-)-IQNP: Potential Radioligands for Visualization of M_1 Muscarinic Acetylcholine Receptor in Brain. Determination of Metabolites Using HPLC," *Nucl. Med. Biol.* **25**, 209-14 (1998).

Bililign, S., L. Liu, C. S. Feigerle, and J. C. Miller, "Metal-Ion Chemistry in Clusters Initiated by Ionization/Dissociation of Organometallic Precursors," *J. Phys. Chem.* **101A**, 4569-79 (1997).

Bililign, S., C. S. Feigerle, and J. C. Miller, "Nonstatistical Bond Breaking in the Multiphoton Ionization/Dissociation of $[Fe(CO)_5]_mAr_n$ Clusters," *Appl. Surf. Sci.* **108**(15), 6312-19 (1998).

Bililign, S., C. S. Feigerle, and J. C. Miller, "Inverse Laser Ablation: Formation and Chemistry of Nanoparticles from Gaseous Precursors," *Appl. Surf. Sci.* **129**, 344-49 (1998).

Bishop, J. B., R. W. Morris, J. C. Seely, L. A. Hughes, K. T. Cain, and W. M. Generoso, "Alterations in the Reproductive Patterns of Female Mice Exposed to Xenobiotics," *Fundam. Appl. Toxicol.* **40**, 191-204 (1997).

Blower, P. J., A. S. Lam, M. J. O'Doherty, A. G. Kettle, A. J. Coakley, and F. F. Knapp, Jr., "Pentavalent Rhenium-188-Dimercaptosuccinic Acid for Targeted Radiotherapy: Synthesis and Preliminary Animal and Human Studies," *Eur. J. Nucl. Med.*, **25**, 613-21 (1998).

Bogard, J. S., K. L. Yuracko, M. E. Murray, R. A. Lowden, and N. L. Vaughn, "Application of Life Cycle Analysis: The Case of Green Bullets," in *Spectrum '98, Proceedings of the International Conference on Decommissioning and Decontamination andon Nuclear and Hazardous Waste Management*, Vol. 1, American Nuclear Society, La Grange Park, Illinois, September 13-18, 1998, pp. 382-89 (1998).

Bohn, A. A., C. S. Forsyth, N. I. Kerkvliet, and A. A. Frank, "Immunologic Effects of Cocaine in Prenatally Exposed Rats and Mice," *Toxic. Lett.* **91**, 47-55 (1997).

Bolch, W. E., J. E. Turner, H. Yoshida, K. B. Jacobson, R. N. Hamm, and O. H. Crawford, "Product Yields from Irradiated Glycylglycine in Oxygen-Free Solutions: Monte Carlo Simulations and Comparison with Experiments," *Rad. Env. Biophysics* **37**(3), 157-66 (1998).

Boll, R. A., S. Mirzadeh, and S. J. Kennel, "Optimization of Radiolabeling of Immunoproteins with ^{213}Bi," *Radiochim. Acta* **79**(2), 145-49 (1997).

Brandes, H. K., F. W. Larimer, T.-Y. S. Lu, J. Dey, and F. C. Hartman, "Roles and Microenvironments of Tryptophanyl Residues of Spinach Phosphoribulokinase," *Arch. Biochem. Biophys.*, **352**, 130-36 (1998).

Bunick, G. J., J. M. Harp, D. Timm, and B. L. Hanson, "Macromolecular Crystal Annealing: Techniques and Case Studies," *The Rigaku J.*, **15**(2), 6-13 (1998).

Campiglia, A. D., D. M. Hueber, F. Moreau, and T. Vo-Dinh, "Phosphorescence Imaging System Using an Acousto-Optic Tunable Filter and a Charge Coupled Device," *Anal. Chim. Acta* **346**, 361-72 (1997).

Campiglia, A. D., F. Moreau, D. M. Heuber, and T. Vo-Dinh, "Phosphorescence Imaging System Using an Acousto-Optic Filter-Based Charge Coupled Device," *Anal. Chim. Acta* **351**, 229-39 (1997).

Campiglia, A. D. and T. Vo-Dinh, "Rapid Screening Method for Cocaine and Benzoylecgonine in Saliva Samples," *Anal. Chem.* **372**(3), 349-55 (1998).

Capitan-Vallvey, L. F., F. Ojeda, M. del Olmo, R. Avidad, A. Navalon, and T. Vo-Dinh, "Use of Transmitted Room Temperature Phosphoroscence to Improve Nalidixic Acid Determination," *Appl. Spectrosc.* **52**(1), 101-05 (1998).

Carver, E. A. and L. Stubbs, "Zooming in on the Human-Mouse Comparative Map: Genome Conservation Re-Examined on a High-Resolution Scale," *Gen. Res.* **7**(12), 1123-37 (1997).

Carver, E. A., L. Issel-Tarver, J. Rine, A. S. Olsen, and L. Stubbs, "Location of Mouse and Human Genes Corresponding to Conserved Canine Olfactory Receptor Gene Subfamilies," *Mammal. Genome* **9**(5), 349-54 (1998).

Casey, D., "What Can Genetic Tests Tell Us?" *The Judges Journal* **36**, 3-6 (1997).

Caveliers, V., P. R. Franken, F. T. Mokler, Q. Lin, H. Luo, and F. F. Knapp, Jr., "Intra-Individual Comparison of 3(R)-BMIPP and 3(S)-BMIPP Isomers in Humans," *J. Nucl. Med.*, **39**(10), 1672-75 (1998).

Chen, C. H., V. V. Golovlev, W. R. Garrett, R. V. Goedert, T. A. Wittaker, and D. W. Templeton, "Optical Power Limiting for Eye Protection from Tunable Lasers," *SPIE* **3146**, 170-75 (1997).

Chen, C. H., N. I. Taranenko, Y. F. Zhu, C. N. Chung, and S. L. Allman, "Laser Mass Spectrometry for DNA Sequencing, Disease Diagnosis, and Fingerprinting," in *Proeedings of Ultrasensitive Biochemical Diagnostics II, SPIE* **2895**, 70-81 (1997).

Chen, C. H., N. I. Taranenko, Y. F. Zhu, C. N. Chung, S. L. Allman, N. R. Isola, and K. J. Matteson, "Various Approaches for Sequencing Single-Stranded and Double-Stranded DNA by MALDI," in *Proceedings of the 45th ASMS Conference*, Palm Springs, California, p. 761 (1997).

Chen, G., K. E. Goodson, C. Griboropoulos, M. C. Hipwell, D. Liepmann, A. Majumdar, S. Maruyama, T. Thundat, C. L. Tien, and N. C. Tien, "Report of Workshop: Thermophysical Phenomena in Microscale Sensors, Devices, and Structures," *Microscale Thermophysical Eng.* **1**(4), 267-74 (1997).

Chen, K. M., D. E. Jesson, S. J. Pennycook, T. Thundat, and R. J. Warmack, "Critical Nuclei Shapes in the Stress-Driven 2D-to-3D Transition," *Phys. Rev. B* **56**, R1700-3 (1997).

Chen, Y.-R., F. C. Hartman, T.-Y. S. Lu, and F. W. Larimer, "D-Ribulose-5-Phosphate 3-Epimerase: Cloning and Heterologous Expression of the Spinach Gene and Purification and Characterization of the Recombinant Enzyme," *Plant Physiol.* **118**, 199-207 (1998).

Chiang, P.-W., R. B. Zhang, L. Stubbs, L. Zhang, L. Zhu, and D. M. Kurnit, "Comparison of Murine Supt4h and a Nearly Identical Expressed, Processed Gene: Evidence of Sequence Conservation Through Gene Conversion Extending into the Untranslated Regions," *Nucl. Acids Res.* **26**, 4960-64 (1998).

Chiang, P.-W., L. Stubbs, L. Zhang, and D. M. Kurnit, "Isolation of Murine SPT5 Homologue: Completion of the Isolation and Characterization of Human and Murine Homologues of Yeast Chromatin Structural Protein Complex SPT4, SPT5 and SPT6," *Genomics* **47**(3), 426-28 (1998).

Cleland, W. E., T. J. Andrews, S. Gutteridge, F. C. Hartman, and G. H. Lorimer, "Mechanism of Rubisco: The Carbamate as General Base," *Chem. Rev.* **98**(2), 549-61 (1998).

Compton, R. N., A. A. Tuinman, C. E. Klots, M. R. Pederson, and D. C. Patton, "Electron Attachment to a Negative Ion: $e+C\text{-}84^{-} \leftarrow C\text{-}84^{-2}$," *Phys. Rev. Lett.* **78**, 4367-70 (1997).

Coumans, E.F.I., F. C. Visser, A. van Lingen, J. J. Bax, G. J. van der Vusse, F. F. Knapp, Jr., and G. W. Sloof, "Exponential Relationship Between DMIPP Uptake and Blood Flow in Normal and Ischemic Canine Myocardium," *Nuklearmedizin* **37**, S54-S59 (1998).

Critser, J. K., D. Gao, and P. Mazur, "Fundamental Cryobiology of Mammalian Spermatozoa," in *Tissue Banking in Reproductive Bioloby*, eds., A. M. Karow, Jr., and J.K. Critser. Academic Press, New York, pp. 263-328 (1997).

Culiat, C. T., E. A. Carver, M. Walkowicz, E. M. Rinchik, N.L.A. Cacheiro, L. B. Russell, W. M. Generoso, and L. Stubbs, "Induced Mouse Chromosomal Rearrangements as Tools for Identifying Critical Developmental Genes and Pathways," *Reprod. Toxicol.* **11**, 345-51 (1997).

Dadachova, E. and S. Mirzadeh, "The Role of Tin in the Direct Labeling of Proteins with Rhenium-188," *J. Nucl. Med. Biol.* **24**(6), 605-08 (1997).

Dadachova, E., S. Mirzadeh, S. V. Smith, F. F. Knapp, Jr., and E. L. Hetherington, "Radiolabeling Antibodies with Holmium-166," *Appl. Radiat. Isot.* **48**, 477-82 (1997).

Datskos, P. G., C. Tav, I. Sauers, and L. A. Pinnaduwage, "Electron Attachment to Thermally Excited Trichlorotrifluoroethane ($1,1,2\text{-}C_2Cl_3F_3$)," *J. Phys. D: Appl. Phys.* **30**, 2596-2602 (1997).

Datskos, P. G., L. A. Pinnaduwage, and J. F. Kielkopf, "Photophysical and Electron Attachment Properties of ArF-Excimer-Laser Irradiated H_2," *Phys. Rev. A* **55**, 4131-42 (1997).

Davis, A. P. and A. Kuklin, "PCR-Genotyping on DNA Extracted from a Mouse Ear-Punch Using the QIAamp Tissue Kit," *Biotechnology and Biotechnological Equip.* **12**(1), 102-03 (1998).

Davis, A. P. and M. J. Justice, "An Oak Ridge Legacy: The Specific Locus Test and Its Role in Mouse Mutagenesis," *Genetics* **148**, 7-12 (1998).

Davis, A. P. and M. J. Justice, "Meeting Report: 11th International Mouse Genome Conference," *Mammal. Genome* **9**(5), 345-48 (1998).

Davis, A. P. and M. J. Justice, "Mouse Alleles: If You've Seen One, You Haven't Seen Them All," *Trends in Genetics* **14**(11), 438-41 (1998).

Deckert, V., R. Zenobi, T. Vo-Dinh, and D. Zeisel, "Imaging of Dye-Labeled DNA with 100-nm Resolution," *Anal. Chem.* **70**(13), 2646-50 (1998).

Deelman, P. W., L. J. Schowalter, and T. Thundat, "*In Situ* Measurements of Temperature-Dependent Strain Relaxation of Ge/Si(111)," *J. Vac. Sci. Technol. A,* **15**(3), 930-34 (1997).

Deelman, P. W., L. J. Schowalter, and T. Thundat, "*In Situ* Measurements of Islanding and Strain Relaxation of Ge/Si(111)," *Mater. Res. Soc. Symp. Proc.* **441**, 373-78 (1997).

Dees, C., C. C. Travis, M. Askari, J. S. Foster, and J. Wimalasena, "DDT Mimics Estradiol by Stimulating Breast Cancer Cells to Enter the Cell Cycle," *Mol. Carcinog.* **18**, 107-14 (1997).

Deng, L., W. R. Garrett, M. G. Payne, and M. A. Moore, "Gain Suppression Involving Both Stimulated Raman and Hyper-Raman Photons in Two-Step Stimulated Emissions," *Chem. Phys. Lett.* **270**, 299-303 (1997).

Deng, L., W. R. Garrett, and M. G. Payne, "Pressure Dependence of the AC Stark Shifts in Nitric Oxide: Resonant Multiphoton-Ionization Spectroscopy Without Space Charge," *Chem. Phys. Lett.* **271**, 15-18 (1997).

Dhar, M. S. and D. K. Johnson, "A Microsatellite Map of the Pink-eyed dilution (*p*) Deletion Complex in Mouse Chromosome 7," *Mammal. Genome* **8**, 143-45 (1997).

Dichtl, B., A. Stevens, and D. Tollervey, "Lithium Toxicity in Yeast is Due to the Inhibition of RNA Processing Enzymes," *Embo. J.* **16**, 7184-95 (1997).

DiLeone, R. J., L. B. Russell, and D. M. Kingsley, "An Extensive 3' Regulatory Region Controls Expression of *Bmp5* in Specific Anatomical Structures of the Mouse Embryo," *Genetics* **148**, 401-08 (1998).

Ding, W., D. McCorkle, and L. A. Pinnaduwage, "Enhanced Formation of Negative Ions by Electron Attachment to High-Excited Molecules in a Flowing Afterflow Plasma," *J. Appl. Phys.* **84**(6), 3051-58 (1998).

Doktycz, M. J. and K. L. Beattie, "Genosensors and Model Hybridization Studies," in *Automated Technologies for Genome Characterization*, ed. T. J. Beugeldsdijk. John Wiley & Sons, Inc., New York, pp. 205-25 (1997).

Doktycz, M. J., F. W. Larimer, M. Pastrnak, and A. Stevens, "Comparative Analyses of the Secondary Structures of Synthetic and Intracellular Yeast MFA2 mRNAs," *Proc. Natl. Acad. Sci. USA* **95**, 14014-22 (1998).

Doyle, J., X. J. Ren, G. Lennon, and L. Stubbs, "Mutations in the *Cacnl1a4* Calcium Channel Gene are Associated with Seizures, Cerebellar Degeneration, and Ataxia in Tottering and Leaner Mutant Mice," *Mammal. Genome* **8**(2), 113-20 (1997).

Doyle, J. L. and L. Stubbs, "Ataxia, Arrhythia, and Ion Channel Gene Defects," *Trends Genet.* **14**, 92-98 (1998).

Easterly, C. E., G. O. Allgood, K. Eckerman, H. Knee, M. Maston, G. McNeilly, J. Munro, N. Munro, R. Toedte, B. Van Hoy, and R. Ward, "Virtual Human: A Diagnostic Tool for Human Studies and Health Effects in the 21st Century," in *Biomedical Sensing and Imaging Technologies*, eds., R. A. Leiberman and T. Vo-Dinh. Proceedings of SPIE, Vol. 3253, pp. 150-54 (1998).

Egidi, P. V., "The Independent Verification Process in Decommissioning, Decontamination, and Reutilization Activities – Description, Benefits, and Lessons Learned," in *Proceedings of the American Nuclear Society Meeting on Decommissioning, Decontamination and Reutilization, Knoxville, Tennessee, September 7-12, 1997*, American Nuclear Society, pp. 535-39 (1997).

Eigler, N., J. Whiting, R. Makkar, H. A. Hidehiko, F. F. Knapp, Jr., and F. Litvack, "RADIANT™ Liquid Isotope Intravascular Radiation Therapy System," in *Proceedings, Symposium on Advances in Cardiovascular Radiation Therapy, Washington, D.C., March 8-10, 1998*, pp. 234-37 (1998).

Eres, G., Y.-C. Hui, T. Thundat, and D. C. Joy, "Direct Epitaxial Growth of Thin-Film Structures," *J. Vac. Sci. Tech. B* **15**(6), 2934-39 (1997).

Eres, G., Y.-C. Hui, T. G. Thundat, and D. C. Joy, "Nanofabrication by Direct Epitaxial Growth," *Microelectronic Eng.* **42**, 519-22 (1998).

Feigerle, C. S., L. Liu, M. Z. Martin, S. R. Desai, and J. C. Miller, "Multiphoton Ionization Studies of Laser-Induced Chemistry in Clusters," in *Resonance Ionization Spectroscopy 1996*, eds., N. Winograd and J. E. Parks. American Institute of Physics, New York, p. 387 (1997).

Fell, T. P., J. D. Harrison, and R. W. Leggett, "A Model for the Transfer of Alkaline Earth Elements to the Fetus," *Radiat. Prot. Dosim.* **79**, 343-50 (1998).

Feng, B., A. Gorin, B. E. Hingerty, N. E. Geacintov, S. Broyde, and D. A. Patel, "Structural Alignment of the (+)-trans-anti-Benzo[a]pyrene-dG Adduct Positioned Opposite dC at a DNA Template-Primer Junction," *Biochemistry* **36**, 13769-79 (1997).

Feng, B., A. Gorin, A. Kolbanovskiy, B. E. Hingerty, N. E. Geacintov, S. Broyde, and D.J. Patel, "Solution Conformation of the (-)-trans-anti-[BP]dG Adduct Opposite a Delection Site in a DNA Duplex: Intercalation of the Covalently Attached Benzo[a]pyrene into the Helix with Base Displacement of," *Biochemistry* **36**, 13780-90 (1997).

Ferrell, T. L., P. B. Crilly, S. F. Smith, A.L. Wintenberg, C. L. Britton, G. W. Morrison, M. N. Erickson, D. Hedden, D. Bouldin, A. Passian, T. Downey, A. Wig, and F. Meriaudeau, "Medical Telesensors," *SPIE* **3253**, 193-98 (1998).

Fields, D. E. and V. M. F. Jacomino, "A Critical Approach to the Calibration of a Watershed Model," *J. Am. Water Resour. Assoc.* **33**, 143-54 (1997).

Fisher, W. G., E. A. Wachter, M. Armas, and C. Seaton, "The Titanium:Sapphire Laser as an Excitation Source in Two-Photon Spectroscopy," *Appl. Spectrosc.* **51**, 218-26 (1997).

Fisher, W. G., W. P. Partridge, Jr. , C. Dees, and E. A. Wachter, "Simultaneous Two-Photon Activation of Type-I Photodynamic Therapy Agents," *Photochem. Photobiol.* **66**, 141-55 (1997).

Fisher, W. G., K. E. Meyer, E. A. Wachter, D. R. Perl, and P. J. Kulowitch, "Laser Induced Fluorescence Imaging of Heat Damage in Polymer Matrix Composites," *Mater. Eval.* **55**, 726-36 (1997).

Fisher, W. G., E. A. Wachter, F. E. Lytle, M. Armas, and C. Seaton, "Source-Corrected Two-Photon Excited Fluoroscence Measurements Between 700 and 880 nm," *Appl. Spectros.* **52**(4), 536-45 (1998).

Fritschy, J. M., D. Benke, D. K. Johnson, H. Mohler, and U. Rudolph, "$GABA_A$-Receptor Alpha-Subunit is an Essential Prerequisite for Receptor Formation *in vivo*," *Neurosci.* **81**(4), 1043-53 (1997).

Fritschy, J.-M., D. K. Johnson, H. Mohler, and U. Rudolph, "Independent Assembly and Subcellular Targeting of $GABA_A$-Receptor Subtypes Demonstrated in Mouse Hippocampal and Olfactory Neurons *In Vivo*," *Neurosci. Lett.* **249**(2-3), 99-102 (1998).

Funderburgh, J. L., A. L. Perchellet, P. Swiergiel, G. W. Conrad, and M. J. Justice, "Keratocan (Kera), a Corneal Keratan Sulfate Proteoglycan, Maps to the Distal End of Mouse Chromosome 10," *Genomics* **52**(1), 110-11 (1998).

Geacintov, N. E., M. Cosman, B. E. Hingerty, S. Amin, S. Broyde, and D. J. Patel, "NMR Solution Structures of Stereoisomeric Polycyclic Aromatic Carcinogen-DNA Adducts: Principles, Patterns, and Diversity," *Chem. Res. Toxicol* **10**, 111-46 (1997).

Geisler, J. G., L. J. Stubbs, W. W. Wasserman, and M. L. Mucenski, "Molecular Cloning of a Novel Mouse Gene with Predominant Muscle and Neural Expression," *Mammal. Genome* **9**(4), 274-82 (1998).

Golovlev, V., S. Allman, W. R. Garrett, N. I. Taranenko, and C. H. Chen, "Laser Induced Acoustic Desorption," *Int. J. Mass Spectrom. Ion Processes* **169**, 69-78 (1997).

Golovlev, V. V., S. L. Allman, W. R. Garrett, and C. H. Chen, "Laser-Induced Acoustic Desorption of Electrons and Ions," *Appl. Phys. Lett.* **71**, 852-54 (1997).

Grad, R., R. Shapire, B. E. Hingerty, S. Broyde, "A Molecular Mechanics and Dynamics Study of the Minor Adduct Between DNA and the Carcinogen 2-(Acetylamino)fluorene (dG-N-2-AAF)," *Chem. Res. Toxicol.* **10**(1), 1123-32 (1997).

Grant, W. F. and E. T. Owens, "Chromosome Aberration Assays in Crepis for the Study of Environmental Mutagens," *Mutation Res.* **410**, 291-307 (1998).

Guhlke, S., P. O. Zamora, J. Sartor, F. F. Knapp, Jr. , H. Bender, B. A. Rhodes, and H.-H. Biersack, "Ascorbic Acid Stabilization of Re-188- and I-131-Radiolabeled Peptides for Radiotherapy," *Radiochim. Acta* **79**, 93-97 (1997).

Guhlke, S., A. Schaffland, P. O. Zamora, J. Sartor, D. Diekmann, H. Bender, F. F. Knapp, and H.-J. Biersack, "^{188}Re- and ^{99m}Tc-MAG3 as Prosthetic Groups for Labeling Amines and Peptides: Approaches with Pre- and Post-Conjugate Labeling," *Nucl. Med. Biol.* **25**, 621-31 (1998).

Hamm, R. N., J. E. Turner, and M. G. Stabin, "Monte Carlo Simulation of Diffusion and Reaction in Water Radiolysis – A Study of Reactant "Jump Through" and Jump Distances," *Radiat. Environ. Biophys.* **36**, 229-34 (1998).

Hamm, R. N., M. G. Stabin, and J. E. Turner, "Investigation of Monte Carlo Models for Chemical Reactions," *Radiat. Environ. Biophys.* **37**(3), 151-56 (1998).

Hansen, G. M. and M. J. Justice, "*Pten,* a Candidate Tumor Suppressor Gene, Maps to Mouse Chromosome 19," *Mammal. Genome* **9**, 88-90 (1998).

Harp, J. M., D. E. Timm, and G. J. Bunick, "Macromolecular Crystal Annealing: Overcoming Increased Mosaicity Associated with Cryocrystallography," *Acta Crystallogr. D* **54**, 622-28 (1998).

Harpel, M. R., F. W. Larimer, and F. C. Hartman, "Multiple Catalytic Roles of His287 of Rhodospirillum rubrum Ribulose 1,5-Bisphosphate Carboxylase/Oxygenase," *Protein Sci.* **7**, 730-38 (1998).

Hartman, F. C., "Finn Wold (1928-1997)," *Protein Sci.* **6**, 2271-72 (1997).

Hasan, A., K.-P. Stengele, H. Giegrich, P. Cornwell, K. W. Isham, R. A. Sachleben, W. Pfleiderer, and R. S. Foote, "Photolabile Protecting Groups for Nucleosides: Synthesis and Photodeprotection Rates," *Tetrahedron* **53**, 4247-64 (1997).

Hasan, J. S., T. D. Jones, and M. D. Morris, "MarCell™ Software for Modeling Bone Marrow Radiation Cell Kinetics," *Med. Phys.* **24**, 1793-96 (1997).

Hirasawa, M., H. K. Brandes, F. C. Hartman, and D. B. Knaff, "Oxidation-Reduction Properties of the Regulatory Site of Spinach Phosphoribulokinase," *Arch. Biochem. Biophys.* **350**, 127-31 (1998).

Hosono, M. N., M. Hosono, P. O. Zamora, S. Guhlke, T. Haberberger, H. Bender, F. F. Knapp, Jr., and H.-J. Biersack, "Localization of Colerectal Carcinoma by Rhenium-188-Labeled B72.3 Antibody in Xenografted Mice," *Annals Nucl. Med.* **12**, 83-88 (1998).

Hoyt, P. R., C. Bartholomew, L. W. Gamer, C.V.E. Wright, S. S. Potter, J. N. Ihle, and M. L. Mucenski, "The Evi-1 proto-oncogene is required at midgestation for neural, heart, and paraxial mesenchyme development," *Mech.Dev.* **65**, 55-70 (1997).

Huang, J.-D., V. Mermall, M. C. Strobel, L. B. Russell, M. S. Mooseker, N. G. Copeland, and N. A. Jenkins, "Molecular Genetic Dissection of Mouse Unconventional Myosin-VA: Tail Region Mutations," *Genetics* **148**, 1963-72 (1998).

Huang, J.-D., M.J.T.V. Cope, V. Mermall, M. C. Strobel, J. Kendrick-Jones, L. B. Russell, M. S. Mooseker, N. G. Copeland, and N. A. Jenkins, "Molecular Genetic Dissection of Mouse Unconventional Myosin-VA: Head Region Mutations," *Genetics* **148**, 1951-61 (1998).

Huang, L.-F., N. Fukai, P. B. Selby, B. R. Olsen, and S. Mundlos, "Mouse Clavicular Development: Analysis of Wild-Type and Cleidocranial Dysplasia Mutant Mice," *Dev. Dyn.* **210**, 33-40 (1997).

Hurst, G. B., K. Weaver, M. J. Doktycz, M. V. Buchanan, A. M. Costello, and M. E. Lidstrom, "MALDI-TOF Analysis of Polymerase Chain Reaction Products from Methanotrophic Bacteria," *Anal. Chem.* **70**, 2693-98 (1998).

Isfort, R. J., D. B. Cody, S. B. Stuard, C. J. Randall, C. Miller, G. M. Ridder, C. J. Doersen, W. G. Richards, B. K. Yoder, J. E. Wilkinson, and R. P. Woychik, "The Combination of Epidermal Growth Factor and Transforming Growth Factor-Beta Induces Novel Phenotypic Changes in Mouse Liver Stem Cell Lines," *J. Cell Sci.* **110**, 3117-29 (1997).

Isfort, R. J., D. B. Cody, W. G. Richards, B. K. Yoder, J. E. Wilkinson, and R. P. Woychik, "Characterization of Growth Factor Responsiveness and Alterations in Growth Factor Homeostasis Involved in the Tumorigenic Conversion of Mouse Oval Cells," *Growth Factors* **13**, 423-36 (1997).

Isfort, R. J., D. B. Cody, C.-J. Doersen, W. G. Richards, B. K. Yoder, J. E. Wilkinson, L.D. Kier, and R. P. Woychik, "The Tetratricopeptide Repeat Containing *TG737* Gene is a Liver Neoplasia Tumor Suppressor Gene," *Oncogene* **15**, 1797-1803 (1997).

Isfort, R. J., D. B. Cody, W. G. Richards, B. K. Yoder, J. E. Wilkinson, and R. P. Woychik, "Characterization of Growth Factor Responsiveness and Alterations in Growth Factor Homeostasis Involved in the Tumorigenic Conversion of Mouse Oval Cells," *Growth Factors* **15**, 81-94 (1998).

Isola, N., D. L. Stokes, and T. Vo-Dinh, "Surface-Enhanced Raman Gene Probes for HIV Detection," *Anal. Chem.* **70**, 1352-56 (1998).

Jagasia, P. A. Belasquez, A. Knedik, T. Vo-Dinh, and P. B. Oldham, "Enhanced Photoactivated Luminescence of Selected Polychlorinated Biphenyl Congers and Aroclor Mixtures," *Microchem. Journal* **57**, 350 (1997).

Jesson, D. E., K. M. Chen, S. J. Pennycook, T. Thundat, and R. J. Warmack, "Mechanisms of Strain Induced Roughening and Dislocation Multiplication in Si_xGe_{1-x} Thin Films," *J. Electron. Mater.* **26**, 1039-47 (1997).

Johnson, D. K., M. J. Justice, K. L. Beattie, M. V. Buchanan, M. Ramsey, L. R. Ramsey, M. J. Paulus, M. N. Ericson, D. P. Allison, D. L. Kress, R. J. Mural, E. C. Uberbacher, and R. C. Mann, "The Functional Genomics Initiative at Oak Ridge National Laboratory," in *Proceedings of the DOE Human Genome Program – Contractor-Grantee Workshop VI, Santa Fe, New Mexico, November 9-13, 1997*, U.S. Department of Energy, pp. 46-48 (1997).

Jones, T. D. and C. E. Easterly, "A RASH Analysis of National Toxicology Program Data: Predictions for 30 Compounds to be Tested in Rodent Carcinogenesis Experiments," *Environ. Health Perspect.* **104**(suppl. 5), 1017-30 (1997).

Jones, T. D., M. D. Morris, and R. W. Young, "Neutron RBEs for Cytopenia and Repopulation of Stromal and Stem Cells: Mathematical Models of Marrow Cell Kinetics," *Health Phys.* **72**, 530-43 (1997).

Jones, T. D., "On 'Toxicity Equivalent Factors' and 'Relative Potency' to Account for Differential Toxicity and Carcinogenicity: Concerns about Uncommon Effects of Dose in Animal Experiments and Environmental Exposures to Humans," *Environmentrics* **9**, 525-39 (1998).

Jones, T. D., M. D. Morris, and S. R. Basavarju, "Atherosclerotic Risks from Chemicals: Part II. A RASH Analysis of *in vitro* and *in vivo* Test Data to Evaluate 45 Potentially Hazardous Compounds," *Arch. Environ. Contam. Tox.* **35**, 164-77 (1998).

Justice, M. J. and D. A. Stephenson, "Mouse Chromosome 13," *Mammal. Genome* 7, S223-S237 (1997).

Justice, M. J., B. Zheng, R. P. Woychik, and A. Bradley, "Using Targeted Large Deletions and High-Efficiency ENU Mutagenesis for Functional Analyses of the Mammalian Genome," in *Methods: A Companion to Methods in Enzymology*, Volume 13(4), ed. M. F. Seldin. Academic Press, Inc., JNL-Comp. Subscriptions, San Diego, pp. 423-36 (1997).

Katkov, I. I. and P. Mazur, "Influence of Centrifugation on Motility, Yield, and Cell Association of Mouse Spermatozoa," *J. Andrology* **19**(2), 232-41 (1998).

Katkov, I. I., N. Katkova, J. K. Critser, and P. Mazur, "Mouse Spermatozoa in High Concentrations of Glycerol: Chemical Toxicity *vs* Osmotic Shock at Normal and Reduced Ocygen Concentrations," *Cryobiology* **37**(4), 325-38 (1998).

Kele, M., R. N. Compton, and G. A. Guiochon, "Optimization of High Performance Liquid Chromatographic Separation of Fullerenes Using 1-methylnaphthalene as a Mobile Phase on a Tetraphenylporphyrin-Silica Stationary Phase," *J. Chromatogr. A* **786**, 31-45 (1997).

Kennel, S. J. and S. Mirzadeh, "Vascular Targeting for Radioimmunotherapy with ^{213}Bi," *Radiochimica Acta* **79**, 87-92 (1997).

Kennel, S. J. and S. Mirzadeh, "Vascular Targeted Radioimmunotherapy with ^{213}B—An Alpha Particle Emitter," *Nucl. Med. and Biol.* **25**, 241-46 (1998).

Kennel, S. J., P. K. Lankford, L. J. Foote, and I. A. Davis, "Monoclonal Antibody to Rat CD63 Detects Different Molecular Forms in Rat Tissue," *Hybridoma* **17**, 509-515 (1998).

Kerchner, H. R., D. P. Norton, A. Goyal, J. D. Budai, D. K. Christen, D. M. Kroeger, Q. He, M. Paranthaman, D. F. Lee, B. C. Sales, F. A. List, and R. Feenstra, "Alternating Current Loses in Biaxially Textured $YBa_2Cu_3O_{7\Delta}$ Films Deposited on Ni Tapes," *Appl. Phys. Lett.* **71**, 2029-31 (1997).

Kerr, G. D. "Development of A-Bomb Survivor Dosimetry," in *Effects of Ionizing Radiation: Atomic Bomb Survivors and Their Children (1945-1995)*, eds., L. E. Peterson and S. Abrahamson. John Henry Press, Washington, DC, pp. 3-29 (1998).

Khrebtukova, I., E. J. Michaud, C. M. Foster, K. L. Stark, D. J. Gardinkel, and R. P. Woychik, "Utilization of Microhomologous Recombination in Yeast to Generate Targeting Constructs for Mammalian Genes," *Mutat. Res.* **401**, 11-25 (1998).

Kim, J., Y. S. Park, J. H. Chung, and L. Stubbs, "The Gene Encoding Sepiapterin Reductase is located in Central Mouse Chromosome 6," *Mammal. Genome* **8**, 942 (1997).

Kim, J., L. Ashworth, E. Branscomb, and L. Stubbs, "The Human Homologue of a Mouse Imprinted Gene, *Peg3*, Maps to a Zinc Finger Gene-Rich Region of Human Chromosome *19q13.4*," *Genome Res.* 7(5), 532-50 (1997).

Kim, J., E. Carver, and L. Stubbs, "Amplification and Sequencing of End Fragments from Bacterial Artificial Chromosome Clones by Single-Primer Polymerase Chain Reaction," *Genome Res.* **253**, 272-75 (1997).

Kim, J. H., L. L. Kiefer, R. P. Woychik, W. O. Wilkison, A. Tuesdale, O. Ittoop, D. Willard, J. Nichols, and M. B. Zemel, "*Agouti* Regulation of Intracellular Calcium in Skeletal Muscle Cells, Vascular Smooth Muscle Cells and Adipocytes. Apparent Interaction with Melanocortin Receptors," *Am. J. Physiol.* **35**, E379-84 (1997).

Klots, C. E., ""Branching Ratios in Activated Systems"-Comment," *J. Phys. Chem.* **101**, 5378 (1997).

Knapp, F. F., Jr., "Therapeutic Clinical Applications of Reactor-Produced Radioisotopes," *Trans. Am. Nucl. Soc.* 77, 539-40 (1997).

Knapp, F. F., Jr., A. L. Beets, S. Guhlke, P. O. Zamora, H. Bender, H. Palmedo, and H.-J. Biersack, "Development of the Alumina-Based Tungsten-188/Rhenium-188 Generator and Use of Rhenium-188-Labeled Radiopharmaceuticals for Cancer Treatment," *Anticancer Research* **17**, 1783-96 (1997).

Knapp, F. F., Jr. , A. L. Beets, S. Guhlke, P. O. Zamora, H. Bender, H. Palmedo, and H.-J. Biersack, "Availability of Rhenium-188 from the Alumina-Based Tungsten-188/Rhenium-188 Generator for Preparation of Rhenium-188-Labeled Radiopharmaceuticals for Cancer Treatment," *Anticancer Res.* **17**, 1803-08 (1997).

Knapp, F. F., Jr., A. L. Beets, S. Guhlke, P. O. Zamora, H. Bender, H. Palmedo, and H.-J. Biersack, "Rhenium-188-Labeled Radiopharmaceuticals for Therapy of Metastatic Breast Cancer," in *Seventh Mediterranean Symposium of Nuclear Medicine and Radiopharmaceuticals*, Athens, Greece, May 7-12, 1997, Mediterranean Publications, Athens, Greece (1997).

Knapp, F. F., Jr., D. W. McPherson, H. Luo, G. Zeeburg, "Radiolabeled Ligands for Imaging the Muscarinic-Cholinergic Receptors of the Heart and Brain," *Anticancer Res.* **17**, 1559-72 (1997).

Knapp, F. F., Jr., "Use of Rhenium-188 for Cancer Treatment," *Canc. Biotherapy and Radiopharm.* **13**(5), 337-49 (1998).

Knapp, F. F. Jr., "Radioisotopes for Cancer Therapy – The Importance and Availability of Reactor-Produced Radioisotopes," in *Proceedings, 8th Mediterranean Symposium on Nuclear Medicine and Radiopharmaceuticals, Rome Italy, May 18-24, 1998*, Mediterra-Publishers, Athens (ISBM 960-85227-7-3), pp. 167-84 (1998).

Knapp, F. F., Jr., "Radionuclide Generators in Nuclear Medicine: Present Status and Future Perspectives," in *Proceedings, International Trends in Pharmaceuticals for Diagnosis and Therapy* (IAEA TECDOC-1029), pp. 485-95 (1998).

Knapp, F. F. J.r, A. L. Beets, S. Mirzadeh, and S. Guhlke, "Use of a New Tandem Cation/Anion Exchange System with Clinical-Scale Generators Provides High Specific Volume Solutions of Technetium-99*m* and Rhenium-188," in *Proceedings, International Trends in Radiophamaceuticals for Diagnosis and Therapy* (IAEA TECDOC-1029), pp. 419-25 (1998).

Knapp, F. F., Jr., J. Kropp, and P. R. Franken, "Radioiodinated BMIPP for Myocardial Imaging – Current Status and Future Perspectives," *Nuklearmedizin* **37**, S8-S11 (1998).

Knapp, F. F., Jr., S. Mirzadeh, A. L. Beets, M. O'Doherty, P. J. Blower, E. S. Verdera, J. S. Gaudiano, J. Kropp, S. Guhlke, H. Palmedo, and H.-J. Biersack, "Reactor-Produced Radioisotopes from ORNL for Bone Pain Palliation," *Appl. Radiat. Isot.* **49**, 309-15 (1998).

Kocher, D. C., "Context for Performance Assessment," in *Proceedings of the 18th U.S. Department of Energy Low-Level Radioactive Waste Management Conference*, D. Lake, ed., Idaho National Engineering and Environmental Laboratory (1997).

Kocher, D. C., "Ionizing Radiation – Standards and Guidances Applicable to the Public," in *Handbook of Health Physics and Radiological Health*, Chapter 4, Section 1, Third Edition, eds., B. Schleien, L. A. Slaback, Jr., and B. K. Birky. Williams & Wilkins, Baltimore, Maryland (1998).

Kocher, D. C. and K. F. Eckerman, "On the Use of Age-Specific Effective Dose Coefficients in Radiation Protection of the Public," in *Topical Issues in Nuclear, Radiation and Radioactive Waste Safety – Contributed Papers* (IAEA TECDOC-1031), International Atomic Energy Agency, Vienna, Austria, pp. 175-81 (1998).

Kotzerke, J., M. Rentschler, G. Glatting, E. Schneider, M. Stabin, F. F. Knapp, Jr., and S.N. Reske, "Dosimetric Fundamentals of Endovascular Brachytherapy Using Re-188 to Prevent Restenosis After Angioplasty," *Nuklearmedizin* **37**, 68-72 (1998).

Kotzerke, J., S. Fenchel, A. Guhlmann, M. Stabin, M. Rentschler, F. F. Knapp, Jr., and S. N. Reske, "Pharmacokinetics of TC-99M-Pertechnetate and Re-188-Perrhenate After Oral Application of Perchlorate-Option of Subsequent Care Using Liquid Re-188 in a Balloon Catheter," *Nucl. Med. Commun.* **19**, 795-801 (1998).

Krause, D. S., M. L. Mucenski, A. M. Lawler, and W. S. May, "CD34 Expression by Embryonic Hematopoietic and Endothelial Cells Does Not Require c-Myb," *Exper. Hematol.* **26**(11), 1086-92 (1998).

Kropp, J. and F. F. Knapp, Jr., "Fatty Acid Scintigraphy," in *Cardiological Nuclear Medicine*, eds., G. Hoer, B. J. Krause, and H. H. Tilmanns. Ecomed Verlagsgesellschaft AG & Co. KG, Landsberg, Germany (ISBN 3-609-62970-3), pp. 293-323 (in German)(1997).

Kropp, J. and F. F. Knapp, Jr., "Editorial," *Nuklearmedizin* 37, 6a (1998).

Kropp, J., M. Eisenhut, W. D. Lehmann, K. R. Ambrose, F. F. Knapp, Jr., and W.-G.Franke, "Metabolism of the Methyl-Branched Fatty Acid BMIPP," *Nuklearmedizin* **37**, S20-24 (1998).

Laqua, K., B. Schrader, G. G. Hoffmann, D. S. Moore, and T. Vo-Dinh, "Nomenclature, Symbols, Units and Their Usage in Spectrochemical Analysis. 11. Detection of Radiation," *Spectrochim. Acta Part B – Atom. Spectrosc.* **52**, 537-52 (1997).

Lazrak, A., G. D. Griffin, and P. C. Gailey, "Studying Electric Field Effects on Embryonic Myocytes," *Biotechniques* **23**, 736-41 (1997).

Lee, I., J. W. Lee, and E. Greenbaum, "Biomolecular Electronics: Vectorial Arrays of Photosynthetic Reaction Centers," *Phys. Rev. Lett.* **79**, 3294-97 (1997).

Leggett, R. W., "Basis and Implications of the ICRP's New Biokinetic Model for Thorium," *Health Phys.* **73**, 587-600 (1997).

Leggett, R. W., "A Model of the Distribution and Retention of Tungsten in the Human Body," *Science of the Total Environment* **206**, 147-65 (1997).

Leggett, R. W., "Response to Dang and Jaiswal" (Letter to the Editor), *Health Physics***75**, 537-38 (1998).

Leggett, R. W., A. Bouville, and K. F. Eckerman, "Reliability of the ICRP's Systemic Biokinetic Models," *Radiat. Prot. Dosim.* **79**, 335-42 (1998).

Liebermann, R. and T. Vo-Dinh, eds., *Biomedical, Sensing, Imaging, and Tracking Technologies III*, SPIE Publishers, Bellingham, Washington (1998).

Liepe, K., J. Kropp, F. F. Knapp, Jr., R. Hliscs, A. Kuehne, and W. G. Franke, "Rhenium-188, Rhenium-186 and Strontium-89 in the Therapy of Painful Bone Metastases," in *Proceedings of the 8th Mediterranean Symposium on Nuclear Medicine and Radiopharmaceuticals*, Rome, Italy, May 18-24, 1998, Mediterra-Publishers, Athens (ISBM 960-85227-7-3), pp. 185-92 (1998).

Lin, H. H., L. J. Stubbs, and M. L. Mucenski, "Identification and Characterization of a Seven Transmembrane Hormone Receptor Using Differential Display," *Genomics* **41**(3), 301-08 (1997).

Lin, W.-Y., C.-P. Lin, B.-T. Hsier, Z.-T. Tsai, T.-C. Yen, S.-J. Wang, G. Ting, S.-J. Yeh, and F. F. Knapp, Jr., "Rhenium-188 HEDP: A New Potential, Generator-Produced Radiotherapeutic Drug for Bone Metastases," *Eur. J. Nucl. Med.* **24**, 590-95 (1997).

Lin, Q., H. Luo, F. Mokler, A. L. Beets, K. R. Ambrose, D. W. McPherson, J. Kropp, and F. F. Knapp, Jr., "Effects of Configuration on the Myocardial Uptake of Radioiodinated 3(R)-BMIPP and 3(S)-BMIPP," *J. Nucl. Med.* **38**, 1434-40 (1997).

Lowndes, D. H., C. M. Rouleau, T. G. Thundat, G. Duscher, E. A. Kenik, and S. J. Pennycook, "Silicon and Zinc Telluride Nanoparticles Synthesized by Pulsed Laser Ablation: Size Distributions and Nanoscale Structure," *Appl Surf. Sci.* **129**, 355-61 (1998).

Luo, H., A. L. Beets, K. R. Ambrose, D. W. McPherson, and F. F. Knapp, Jr., "Synthesis, *In Vitro* and *In Vivo* Evaluation of Fluorine-18-Labeled (R,R)- and (R,S)-Isomers of FQNPe – New Candidates for Muscarinic-Cholinergie Receptor Imaging by PET," *J. Lab Radiopharm.Compds.* **XLI**, 681-704 (1998).

Lyon, B. F., R. Ambrose, G. Rice, and C. J. Maxwell, "Calculation of Soil-Water and Bentic Sediment Partition Coefficients for Mercury," *Chemosphere* **35(4)**, 791-808 (1997).

Mabel, A. M., S. H. Lin, and L. A. Pinnaduwage, "Potential Energy Surfaces of H_2^-," *Chem. Phys. Lett.* **285**, 114-20 (1998).

Mao, B., A. Gorin, Z. T. Gu, B. E. Hingerty, S. Broyde, and D. J. Patel, "Solution Structure of the Aminofluorine [AF]-Intercalated Conformer of the syn [AF]-c^8-dG Adduct Opposite a -2 Deletion Site in the NarI Hot Spot Sequence Context," *Biochemistry* **36**, 14479-90 (1997).

Mao, B., Z. T. Gu, A. Gorin, B. E. Hingerty, S. Broyde, and D. J. Patel, "Solution Structure of the Aminofluorene [AF]-stacked Conformer of the syn [AF]-C^8-dG Adduct Positioned at a Template-Primer Junction," *Biochemistry* **36**, 14491-501 (1997).

Mao, B., B. E. Hingerty, S. Broyde, and D. J. Patel, "Solution Structure of the Aminofluorene [AF]-Intercalated Conformer of the syn [AF]-C^8-dG Adduct Opposite dC in a DNA Duplex," *Biochemistry* **37**, 81-94 (1998).

Mao, B., B. E. Hingerty, S. Broyde, and D. J. Patel, "Solution Structure of the Aminofluorene [AF]-external Conformer of the anti [AF]-C(Sup 8)-dG Adduct Opposite dC in a DNA Duplex," *Biochemistry* **37**, 95-106 (1998).

Marker, P. C., K. Seung, L. B. Russell, and D. M. Kingsley, "Spectrum of *Bmp5* Mutations from Germline Mutagenesis Experiments in Mice," *Genetics* **145**, 435-43 (1997).

Maya, L., M. Paranthaman, F. A. List, and R. J. Warmack, "Sputtered Cu/Co Films for Giant Magnetoresistance (GMR)-Effect of Plasma Gas and Annealing Treatment," *J. Vac. Sci. Technol.* **15**, 2807-11 (1997).

Maya, L., J. R. Thompson, K. J. Song, and R. J. Warmack, "Thermal Conversion of an Iron Nitride-Silicon Nitride Precursor into a Ferromagnetic Nanocomposite," *J. Appl. Phys.* **83**, 905-10 (1998).

Maya, L., T. Thundat, C. S. Yust, and L. M. Anovitz, "Characterization of Sputtered Amorphous Platinum Dioxide Films," *J. Appl. Phys.* **84**(11), 6382-86 (1998).

McMurry, T. J., C. G. Pippin, C. Wu, K. A. Deal, M. W. Brechbiel, S. Mirzadeh, and O.A. Gansow, "Physical Parameters and Biological Stability of Yttrium(III) Diethylenetriaminepentacetic Acid Derivative Conjugates," *J. Med. Chem.* **41**, 3546-49 (1998).

Menon, P. M., C. S. Feigerle, T. Thundat, L. Heatherly, and R. E. Clausing, "Indexing the Hopper Shaped {111} Face Produced in Chemical Vapor Deposited Diamond," *App. Phys. Lett.* **71**(21), 3078-80 (1997).

Meriadeau, F., J. P. Goudonnet, E. Carver, J. E. Parks, K. B. Jacobson, R. J. Warmack, and T. L. Ferrell, "Photon Scanning-Tunneling Microscopy of Unstained Mammalian Cells and Chromosomes," *Appl. Opt.* **37**(31), 7276-88 (1998).

Meriadeau, F., T. Downey, A. Passian, A. Wig, and T. L. Ferrell, "Environment Effects on Surface-Plasmon Spectra in Gold-Island Films," *Appl. Opt.* **37**, 8030-37 (1998).

Michaud, E. J., R. L. Mynatt, R. J. Miltenberger, M. L. Klebig, J. E. Wilkinson, M. B. Zemel, W. O. Wilkison, and R. P. Woychik, "Role of the Agouti Gene in Obesity," *J. Endocrinology* **155**, 207-09 (1997).

Miller, J. C., "Introduction to Laser Desorption and Ablation," in *Laser Ablation and Desorption, Volume 30, Methods of Experimental Physical Sciences*, eds. J. C. Miller and H. F. Haglund, Jr. Academic Press, New York, pp. 1-12 (1998).

Miller, J. C., and R. F. Haglund, Jr., eds., *Laser Ablation and Desorption, Volume 30, Methods of Experimental Physical Sciences.* Academic Press, New York, 647 pp. (1998).

Miltenberger, R. J., R. L. Mynatt, J. E. Wilkinson, and R. P. Woychik, "The Role of the *Agouti* Gene in the Yellow Obese Syndrome," *J. Nutrition* **127**, S1902-07 (1997).

Mirzadeh, S., F. F. Knapp, Jr., and R. M. Lambrecht, "Burn-Up Cross Section of Tungsten-188," *Radiochimica Acta* 77, 99-102 (1997).

Mirzadeh, S., "Generator-Produced Alpha-Emitters ," *Appl. Radiat. Isot.* **49**, 345-49 (1998).

Mirzadeh, S. and P. Walsh, "Numerical Evaluation of the Production of Radionuclides in a Nuclear Reactor (Part I)," *Appl. Radiat. Isot.* **49**, 379-82 (1998).

Mirzadeh, S. and P. Walsh, "Numerical Evaluation of the Production of Radionuclides in a Nuclear Reactor (Part II)," *Appl. Radiat. Isot.* **49**, 383-95 (1998).

Mirzadeh, S., F. F. Knapp, Jr., C. W. Alexander, and L. F. Mausner, "Evaluation of Neutron Inelastic Sacattering for Radioisotope Production," *Appl. Radiat. Isot.* **48**, 441-46 (1997).

Mitchell, T. J., G. Ostrouchov, E. L. Frome, and G. D. Kerr, "A Method for Estimating Occupational Radiation Dose to Individuals Using Weekly Dosimetry Data," *Radiat. Res.* **147**, 195-207 (1997).

Munro, N. B. and K. F. Eckerman, "Impacts of Physiological Changes During Pregnancy on Maternal Biokinetic Modeling," *Radiat. Prot. Dosim.* **79**, 327-33 (1998).

Mural, R. J., X. Guan, M. Shah, Y. Xu, and E. C. Uberbacher, "Gene Discovery and Sequence Annotation in the GRAIL-genQuest Environment," in *Current Protocols in Human Genetics, Supplement 6*, ed. A. Boyle. John Wiley & Sons., Inc., New York, pp. 6.5.1-6.5.22 (1997).

Murray, M. B., D. K. Tadaki, S. R. Campion, J. A. Lamerdin, E. H. Serpersu, T. D. Bradrick, and S. K.Niyogi, "Structure-Function Analysis of a Conserved Aromatic Cluster in the N-Terminal Domain of Human Epidermal Growth Factor," *Protein Eng.* **11**, 1041-50 (1998).

Mynatt, R. L., R. J. Miltenberger, M. L. Klebig, M. B. Zemel, J. E. Wilkinson, W. O. Wilkison, and R. P. Woychik, "Combined Effects of Insulin Treatment and Adipose Tissue-Specific Agouti Expression on the Development of Obesity," *Proc. Natl. Acad. Sci. USA* **94**, 919-22 (1997).

Nagesha, K. and L. A. Pinnaduwage, "O^- Formation from O_2 via Rydberg – Rydberg Electron Transfer," *J. Chem. Phys.* **109**, 7124-27 (1998).

Neelam, B., A. Richter, S. G. Chamberlin, S. M. Puddicombe, M. B. Murray, K. Nandagopal, and S. K. Niyogi, "Structure-Function Analysis of a Conserved Aromatic Cluster in the N-terminal Domain of Human Epidermal Growth Factor," *Protein Eng.* **11**, 1041-50 (1998).

Neelam, B., A. Richter, S. G. Chamberlin, S. M. Puddicombe, L. Wood, M. B. Murray, K. Nandagopal, S. K. Niyogi, and D. E. Davies, "Structure-Function Studies of Ligand-Induced Epidermal Growth Factor Receptor Dimerization," *Biochem.* **37**(14), 4884-91 (1998).

Neuhaus, I. M., C. S. Sommardahl, D. K. Johnson, and D. R. Beier, "Microsatellite DNA Variants Between the FVB/N and C3HeB/FeJLe and C57BL/6J Mouse Strains," *Mammal. Genome* **8**, 506-09 (1997).

Norton, S. J. and T. Vo-Dinh, "Diffraction Tomographic Imaging with Photon Density Wves: An Explicit Solution," *J. Opt.Soc. Am. A* **15**(10), 2670-77 (1998).

Opresko, D. M., "Review of the Genus Schizopates (Cnindaria: Anthipatharia: Schizopathidae) with a Description of a New Species from the Indian Ocean," *Proc. Biol. Soc. Wash.* **110**, 157-66 (1997).

Opresko, D. M., R. A. Young, R. A. Faust, S. S. Talmage, A. P. Watson, R. H. Ross, K. A. Davidson, and J. King, "Chemical Warfare Agents: Estimating Oral Reference Doses," *Rev. Env. Cont. and Toxicol.* **156**, 1-183 (1998).

Otto, F., P. B. Selby, M. J. Owen, *et al.*, "*Cbfal*, a Candidate Gene for Cleidocranial Dysplasia Syndrome, is Essential for Osteoblast Differentiation and Bone Development," *Cell* **89**, 765-71 (1997).

Pai, W. W., J. Zhang, J. F. Wendelken, and R. J. Warmack, "Magnetic Nanostructures Fabricated by STM-Assisted Chemical Vapor Deposition," *J. Vac. Sci. Technol.* **15**, 785-87 (1997).

Pal, A., T. Sau, T. Pal, and T. VoDinh, "Determination of Aluminum in Water Through Formation of Fluorescent Dibenzoylmethane-Aluminum Complex and Its Structure Elucidation," *Indian J. Chem.* **75**, 78-80 (1998).

Pal, A., T. Sau, T. Pal, and T. VoDinh, "A New Fluorescence Method for the Determination of Ammonia," *Indian J. Chem. A* **37**(8), 753-54 (1998).

Pal, T. and T. Vo-Dinh, "A New Photoactivated Fluorescence Detection Method for Trichlorethylene," *J. Indian Chem. Soc.* **75**(8), 470-73 (1998).

Pal, T., V. A. Narayanan, D. L. Stokes, *et al.*, "Surface-Enhanced Raman Detection of Nicotinamide in Vitamin Tablets," *Anal. Chim. Acta* **368**(1-2), 21-28 (1998).

Parks, J. E., J. S. Armfield, T. E. Barber, J.M.E. Storey, E. A. Wachter, "*In Situ* Measurement of Fuel in the Cylinder Wall Oil Film of a Combustion Engine by LIF Spectroscopy," *Appl. Spectros.* **52**(1), 112-18 (1998).

Patel, D. J., B. Mao, Z. T. Gu, B. E. Hingerty, A. Gorin, A. K. Basu, and S. Broyde, "Nuclear Magnetic Resonance Solution Structures of Covalent Aromatic Amine-DNA Adducts and Their Mutagenic Relevance," *Chem. Res. Toxicol.* **11**(5), 391-407 (1998).

Perou, C. M. A. Perchellet, T. Jago, R. Pryor, J. Kaplan, and M. J. Justice, "Comparative Mapping in the Beige-Satin Region of Mouse Chromosome 13," *Genomics* **39**(2), 136-46 (1997).

Persans, P. D., P. W. Deelman, K. L. Stokes, and T. Thundat, "Optical Studies of GE Islanding on Si(111)," *Appl. Phys. Lett.* **70**, 472-74 (1997).

Pinnaduwage, L. A., "Implications of Electron Attachment to Highly-Excited States in Pulsed Power Discharges," in *Digest of Technical Papers of the 11th IEEE Pulsed Power Conference*, eds., G. Cooperstein and I. Vitkovitsky. IEEE Publishing Services, New York, pp. 1048-53 (1997).

Pinnaduwage, L. A. and P. G. Datskos, "Electron Attachment to Excited States of Silane: Implications for Plasma Processing Discharges," *J. Appl. Phys.* **81**, 7715-27 (1997).

Pinnaduwage, L. A., W. Ding, and D. L. McCorkle, "Enhanced Electron Attachment to Highly-Excited Molecules Using a Plasma Mixing Scheme," *J. Appl. Phys.* **71**(25), 3634-36 (1997).

Pinnaduwage, L. A. and Y. F. Zhu, "Long-Time Stability of Superexcited High Rydberg Molecular States," *Phys. Rev. Lett.* **277**(1-3), 147-52 (1997).

Pinnaduwage, L. A. and Y. Zhu, "High-Rydberg Fragment Formation Via Core Dissociation of Superexcited Rydberg Molecules," *J. Chem. Phys.* **108**(16), 6633-37 (1998).

Pinnaduwage, L. A., P. G. Datskos, and C. Tav, "Electron Attachment to Photofragments and Other Species in Laser-Irradiated CCl_2F_2," *J. Appl. Phys.* **84**(7), 3442-50 (1998).

Poole, T. L. and A. Stevens, "Structural Modifications of RNA Influence the 5' Exoribonucleolytic Hydrolysis by XRN1 and HKE1 of Saccharomyces Cerevisiae," *Biochem. Biophys. Res. Commun.* **235**, 799-805 (1997).

Popp, R. A., D. M. Popp, S. G. Shinpock, M. Y. Yang, J. G. Mural, M. D. Aguinaga, P. Kopsombut, P. D. Roa, E. A. Turner, and E. M. Rubin, "A Transgenic Mouse Model of Hemoglobin S. Antilles Disease," *Blood* **89**(11), 4204-12 (1997).

Popp, R. A., S. G. Shinpock, D. M. Popp, G. K. Clemons, and D. B. Van Wyck, "Erthropoietin Level and Effect of rHuEPO in Beta-Thalassemic Mice," *Cooleys Anemia* **850**, 455-58 (1998).

Postigo, A. A., A. M. Sheppard, M. L. Mucenski, and D. C. Dean, "c-Myb and Ets Proteins Synergize to Overcome Transcriptional Repression by ZEB," *Embo J.* **16**(13), 324-34 (1997).

Potter, M. D., S. G. Shinpock, R. A. Popp, D. M. Popp, V. Godfrey, D. A. Carpenter, A. Bernstein, D. K. Johnson, and E. M. Rinchik, "Mutation in the Murine Fitness 1 Gene Result in Defective Hematopoiesis," *Blood* **90**(5), 1850-57 (1997).

Pounds, J. G. and R. W. Leggett, "The ICRP Age-Specific Biokinetic Model for Lead: Validations, Empirical Considerations, and Explorations," *Env. Health Perspec.* **106**, 1505-11 (1998).

Richards, W. G., B. K. Yoder, R. J. Isfort, P. G. Detilleux, C. Foster, N. Neilsen, R. P. Woychik, and J. E. Wilkinson, "Isolation and Characterization of Liver Epithelial Cell Lines from Wild-Type and Mutant TgN737 Rpw Mice," *Am. J. Pathol.* **150**, 1189-97 (1997).

Richards, W. G., W. E. Sweeney, B. K. Yoder, J. E. Wilkinson, R. P. Woychik, and E. D. Avner, "Epidermal Growth Factor Receptor Activity Mediates Renal Cyst Formation in Polycystic Kidney Disease," *J. Clin. Investig.* **101**(5), 935-39 (1998).

Rikke, B. A., D. K. Johnson, and T. E. Johnson, "Molecular Genetic Architecture of the Murine Albino-Deletion Complex: High-Resolution Microsatellite Map and Genetically-Anchored YAC Framework Map," *Genome Res.* **147**, 787-99 (1997).

Roy, D., B. E. Hingerty, R. Shapiro, and S. Broyde, "A Slipped Replication Intermediate Model is Stablized by the Syn Orientation of N-2-aminofluorene- and N-2-(acetyl)aminofluorene-modified Guanine at a Mutational Hotspot," *Chem. Res. Toxicol.* **11**(11), 1301-11 (1998).

Russell, L. B. and W. L. Russell, "Spontaneous Mutations Recovered as Mosaics in the Mouse Specific-Locus Test (Vol. 93, pg. 13072, 1996)," in *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 94, National Academy of Sciences, Washington, D.C., p. 4233 (Correction Addition)(1997).

Russell, L. B., P. R. Hunsicker, D. K. Johnson, and M. D. Shelby, "Unlike Other Chemicals, Etoposide (a Topoisomerase-II Inhibitor) Produces Peak Mutagenicity in Primary Spermatocytes of the Mouse," *Mutat. Res.* **400**(1-2), 279-86 (1998).

Russell, W. L., J. W. Banhgam, and L. B. Russell, "Differential Response of Mouse Male Germ-Cell Stages to Radiation-Induced Specific-Locus and Dominant Mutations," *Genetics* **148**(4), 1567-78 (1998).

Sadana, A. and T. Vo-Dinh, "Antibody-Antigen Binding Kinetics: A Model for Multi-Valency Antibodies for Large Antigen Systems," *Appl. Biochem. and Biotech.* **67**, 1-22 (1997).

Sadana, A. and T. Vo-Dinh, "Single- and Dual-Fractal Analysis of Hybridization Binding Kinetics: Biosensor Applications," *Biotech. Prog.* **14**(5), 782-90 (1998).

Schrick, J. J. and P. B. Selby, "The Thick Tail Mutation Causes Anomalies of the Axial Skeleton," *J. Hered.* **88**, 439-45 (1997).

Schultze, A. E., D. O. Schaeffer, M. D. Potter, and D. K. Johnson, "Alterations in Growth, Haematopoiesis and Serum Chemistry Profiles in Fitness 1(4226SB) Mutant Mice," *Compar. Haematology Int.* **7**(3), 143-51 (1997).

Schultze, A. E., R. H. Poppenga, and D. K. Johnson, "Alterations in Serum and Tissue Iron Profiles Associated with Mutations in the Fitness 1 (4226SB) Locus of Mice," *Comp. Haematology Int.* **8**, 72-76 (1998).

Selby, P. B., "Major Impacts of Gonadal Mosaicism on Hereditary Risk Esimation, Origin of Hereditary Diseases, and Evolution," *Genetica* **102/103**, 445-62 (1998).

Selby, P. B., "Discovery of Numerous Clusters of Spontaneous Mutations in the Specific-Locus Test in Mice Necessitates Major Increases in Estimates of Doubling Doses," *Genetica* **102/103**, 462-87 (1998).

Shafizadeh, N., Ph. Bréchignac, M. Dyndgaard, J. H. Fillion, D. Gauyacq, B. Levy, J. C. Miller, T. Pino, and M. Raoult, "A, C, and D Electronic States of the Ar-NO van der Waals Molecule Revisited: Experiment and Theory," *J. Chem. Phys.* **108**, 9313-26 (1998).

Shapiro, R., S. Ellis, B. E. Hingerty, and S. Broyde, "Effect of Ring Size on Conformations of Aromatic Amine-DNA Adducts: The Aniline-C8 Guanine Adduct Resides in the B-DNA Major Groove," *Chem. Res. Toxicol.* **11**(4), 335-41 (1998).

Shen, S., G. L. DeNardo, T. D. Jones, R. B. Wilder, R. T. O'Donnell, and S. J. DeNardo, "A Preliminary Cell-Kinetics Model of Thrombocytopenia After Radioimmunotherapy," *J. Nucl. Med.* **39**, 1223-29 (1998).

Shin, M. K., L. B. Russell, and S. M. Tilghman, "Molecular Characterization of Four Induced Alleles at the Ednrb Locus," in *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 94, National Academy of Sciences, Washington, D.C., pp. 13105-110 (1997).

Siegrist, R. L., K. S. Lowe, L. C. Murdoch, D. A. Pickering, and T. L. Case, "*In Situ* Oxidation by Fracture Emplaced Reactive Solids," *J. Environ. Eng.* (1997).

Siegrist, R. L., K. S. Lowe, L. W. Murdoch, and D. A. Pickering, "Reactive Fractures as Horizontal Barriers for In-Situ Remediation of Chlorinated Organic Compounds," *J. Environ. Eng.* (1998).

Simpson, M. L., C. A. Bennett, M. S. Emery, D. P. Hutchinson, G. H. Miller, R. K. Richards, and D. N. Sitter, "Coherent Imaging Using 2-D Focal-Plane Arrays: Design and Applications," *Appl. Opt.* **36**, 6913-20 (1997).

Singh, S. B., W. A. Beard, B. E. Hingerty, S. H. Wilson, and S. Broyde, "Interactions Between DNA Polymerase Beta and the Major Covalent Adduct of the Carcinogen (+)-anti-Benzo[a]pyrene Diol Epoxide with DNA at a Primer — Template Junction," *Biochemistry* **37**, 878-84 (1998).

Sloof, G., F. C. Visser, J. J. Bax, A. van Lingen, J. Ersels, F. F. Knapp, Jr., and G. J. Teule, "Increased Uptake of 15-(p-iodophenyl)-3-(R,S)-methylpentadecanoic Acid (BMIPP) in Chronic Ischemic Heart Disease: Comparison with [F-18]-2-Flurorodeoxyglucose (FDG) Uptake," *Eur. J. Nucl. Med.* **38**, 1424-29 (1997).

Sloof, G., F. C. Visser, J. J. Bax, A. van Lingen, J. Ersels, F. F. Knapp, Jr., and G. J. Teule, "Increased Uptake of Iodine-123-BMIPP in Chronic Ischemic Heart Disease: Comparison with Fluorine-18-FDG SPECT," *J. Nucl. Med.* **39**, 255-60 (1998).

Sommardahl, C. S., R. P. Woychik, W. E. Sweeney, E. D. Avner, and J. E. Wilkinson, "Efficacy of Taxol in the orpk Mouse Model of Polycystic Kidney Disease," *Pediatric Nephrol.* **11**, 728-33 (1997).

Stevens, A., "Endonucleolytic Cleavage of RNA at 5' Endogenous Stem Structures by Human Flap Endonuclease 1," *Biochem. Biophys. Res. Commun.* **251**, 501-08 (1998).

Stokes, D. L., M. J. Sepaniak, and T. Vo-Dinh, "Development of a New Capillary Electrophoresis-Based Fiberoptic Sensor," *Biomedical Chromatogr.* **11**, 187-92 (1997).

Strijckmans, V., M. Bottlaender, H. Luo, M. Ottaviani, D. W. McPherson, C. Loc'h, C. Fuseau, F. F. Knapp, Jr. , and B. Maziere, "Positron Emission Tomographic Investigations of Central Muscarinic Cholinergic Receptors with Three Isomers of [^{76}Br]BrQNP," *Eur. J. Nucl. Med.* **24**, 475-82 (1997).

Stubbs, L., E. A. Carver, N.L.A. Cacheiro, M. Shelby, and W. Generoso, "Generation and Characterization of Heritable Reciprocal Translocations in Mice," *Methods–A Companion to Methods in Enzymology* **13**(4), 397-408 (1997).

Tanaka, G., H. Kawamura, R. V. Griffith, M. Cristy, and K. F. Eckerman, "Reference Man Models for Males and Females of Six Age Groups of Asian Populations," *Radiat. Prot. Dosim.* **79**, 383-86 (1998).

Taranenko, N. I., C. N. Chung, Y. F. Zhu, S. L. Allman, V. V. Golovlev, N. R. Isola, S. A. Martin, L. A. Haff, and C. H. Chen, "Matrix-Assisted Laser Desorption/Ionization for Sequencing Single-Stranded and Double-Stranded DNA," *Rapid Commun. Mass Spectrom.* **11**, 386-92 (1997).

Taranenko, N. I., L. Y. Chang, C. H. Chen, K. J. Matteson, S. L. Allman, K. Tang, and S.A. Martin, "Population Screening of DNA Mutation by MALDI," in *Proceedings of the 45th ASMS Conference*, Palm Springs, California, p. 33 (1997).

Taranenko, N. I., L. Y. Chang, S. L. Allman, V. V. Golovlev, N. R. Isola, N. V. Taranenko, Z. F. Zhu, and C. H. Chen, "Mass Spectrometry Analysis of DNA Typing for Forensic Applications," in *Proceedings of the 45th ASMS Conference*, Palm Springs, California, p. 53 (1997).

Taranenko, N. I., V. V. Golovlev, S. L. Allman, N. V. Taranenko, C. H. Chen, J. Hong, and L. Y. Chang, "Matrix-Assisted Laser Desorption/Ionization for Short Tandem Repeat Loci," *Rapid Commun. Mass Spectrom.* **12**, 413-18 (1998).

Taranenko, N. I., S. L. Allman, V. V. Golovlev, N. V. Taranenko, N. R. Isola, and C. H. Chen, "Mass Spectrometry Sequencing of DNAs Longer Than 100 Nucleotides," *Nucleic Acids Res.* **26**, 2488-90 (1998).

Tav, C., P. G. Datskos, and L. A. Pinnaduwage, "Electron Attachment to Boron Trichloride," *J. Appl. Phys.* **84**, 5805-07 (1998).

Taylor, D. M. and R. W. Leggett, "A Generic Biokinetic Model for the Lanthanide Elements," *Radiat. Prot. Dosim.* **79**, 351-54 (1998).

Terzaghi-Howe, M., G.-W. Chang, and D. Popp, "Emergence of Undifferentiated Rat Tracheal Cell Carcinomas, but not Squamous Cell Carcinomas, is Associated with a Loss of Expression of E-Cadherin and a Loss of Gap Junction Communication," *Carcinogenesis* **18**, 2043-50 (1997).

Thundat, T., P. I. Oden, and R. J. Warmack, "Microcantilever Sensors," *Microscale Thermophys. Eng.* **1**, 185-99 (1997).

Thundat, T., P. I. Oden, and R. J. Warmack, "Chemical, Physical, and Biological Detection Using Microcantilevers," in *Microstructures and Microfabricated Systems*, eds., P. J. Hesketh, G. Barna, and H. G. Hughes. The Electrochemical Society, Pennington, New Jersey, pp. 179-87 (1997).

Thundat, T., P. I. Oden, and R. J. Warmack, "Nanosensor Array Chips," in *Molecular Nanotechnology*, ed., S. A. Minden. International Business Communications, San Diego, pp. 3.1-3.30 (1997).

Tuminello, P. S., E. T. Arakawa, B. N. Khare, J. Wrobel, M. R. Querry, and M. E. Milham, "Optical Properties of Bacillus Subtilis Spores from 0.2 to 2.5 Microns," *Appl. Opt.* **36**, 2818-24 (1997).

Uberbacher, E. C., R. J. Mural, M. B. Shah, Y. Xu, S. A. Martin, S. Petrov, J. R. Snoddy, M. Parang, M. Zorn, S. Spengler, D. Davey, T. Gaasterland, P. Schaad, S. Letovsky, B. Cottingham, D. Haussler, P. Pavzner, and C. Overton, "The Genome Channel and Genome Annotation Consortium," in *Proceedings of the DOE Human Genome Program – Contractor-Grantee Workshop VI, Santa Fe, New Mexico, November 9-13, 1997*, U.S. Department of Energy, pp. 75-77 (1997).

Uberbacher, E. C., Y. Xu, M. B. Shah, V. Olman, M. Parang, and R. J. Mural, "An Editing Environment for DNA Sequence Analysis and Annotation," in *Proceedings of the Third Pacific Symposium on Biocomputing, Kapalua, Hawaii, January 5, 1998*, pp. 217-27 (1998).

Ulanovsky, A. V. and K. F. Eckerman, "Absorbed Fractions for Electron and Photon Emissions in the Developing Thyroid: Fetus to Five Year Old," *Radiat. Prot. Dosim.* **79**, 419-24 (1998).

Ulanovsky, A. V. and K. F. Eckerman, "Modifications to the ORNL Phantom Series in Simulation of the Responses of Thyroid Detectors," *Radiat. Prot. Dosim.* **79**, 429-31 (1998).

Varadaraj, K., S. S. Kumari, and D. M. Skinner, "Molecular Characterization of Four Members of the Alpha-Tubulin Gene Family of the Bermuda Land Crab Gecarcinus lateralis," *J. Exp. Zool.* **278**, 63-77 (1997).

Verdera, E. S., J. Gaudiano, A. Leon, G. Martinez, A. Robles, E. Savio, E. Leon, D. W. McPherson, and F. F. Knapp, Jr., "Rhenium-188-HEDP-Kit Formulation and Quality Control," *Radiochim. Acta* **79**(2), 113-18 (1997).

Visser, F. C. and F. F. Knapp, Jr., "Single-Photon Imaging of Myocardial Metabolism: The Role of Iodine-123-Fatty Acids and Fluorine-18 Deoxyglucose," in *Nuclear Medicine in Clinical Diagnosis and Treatment*, Churchill Livingstone Publications, 1998 Edition, Edinburgh-London, pp. 1497-1508 (1998).

Vo-Dinh, T., M. Panjehpour, B. F. Overholt, and P. Buckley, III, "Laser-Induced Differential Fluorescence Method for Cancer Diagnosis Without Biopsy Surgery," *Appl. Spectrosc.* **51**, 58-63 (1997).

Vo-Dinh, T., N. H. Velthorst, D. S. Moore, and B. Schrader, "Laser-Based Molecular Spectroscopy for Chemical Analysis: Luminescence," *Pure Appl. Chem.* **69**, 1435-49 (1997).

Vo-Dinh T., "Surface-Enhanced Raman Spectroscopy Using Metallic Nanostructures," *Trends Anal. Chem.* **17**, 557 (1998).

Vo-Dinh, T., J. Fetzer, and A. Campiglia, "Monitoring and Characterization of Polyaromatic Compounds in the Environment," *Talanta* **47**, 943-69 (1998).

Vo-Dinh, T. and T. Pal., "A New Photoactivated Fluorescence Detection Method for Trichlorethylene (TCE)," *J. Indian Chem. Soc.* **75**(8), 470-73 (1998).

Vo-Dinh, T., N. Isola, J. P. Alarie, D. Landis, G. D. Griffin, and S. Allison, "Development of a Multiarray Biosensor for DNA Diagnostics," *Instrum. Sci. Technology* **26**(5), 503-14 (1998).

Vo-Dinh, T., M. Panjehpour, and B. F. Overholt, "Laser-Induced Fluorescence for Esophageal Cancer and Dysplasia Diagnosis," in *Proceedings, New York Academy of Sciences*, Vol. 838, p. 116 (1998).

Wachter, E. A., and W. G. Fisher, "Coherent Burst Laser Ranging: Decoupling Resolution and Unambiguous Range," *Opt. Lett.* **22**, 570-75 (1997).

Wang, S.-J., W. Y. Lin, M. N. Chen, B. T. Hsieh, L. H. Shen, Z. T. Tsai, G. Ting, J. T. Chen, W. L. Ho, S. Mirzadeh, and F. F. Knapp, Jr., "Rhenium-188 Microspheres: A New Radiation Synovectomy Agent," *Nucl. Med. Commun.* **19**, 427-33 (1998).

Wang, S.-J., W.-Y. Lin, M.-N. Chen, C.-S. Chi, J.-T. Chen, W.-L. Ho, B.-T. Hsieh, L.-H. Shen, Z.-T. Tsai, G. Ting, S. Mirzadeh, and F. F. Knapp, Jr., "The Efficacy of Intratumoral Injection of Rhenium-188 Microsphere in Animal Model with Hepatoma," *J. Nucl. Med.* **39**, 1752-57 (1998).

Wassom, J. S., "Book Review: Handbook of Carcinogenicity Potency and Genotoxicity Database (CPDB)," *Mutation Res. Forum* **2**, 17 (1997).

Weimann, P. A., T. D. Jones, M. A. Hillmyer, F. S. Bates, J. D. Londono, Y. Melnichenko, G. D. Wignall, and K. Almdal, "Phase Behavior of Isotactic Polypropylene-Poly(ethylene/Ethylethylene) Random Copolymer Blends," *Macromolecules* **30**(12), 3650-57 (1997).

Wiarda, D. and C. C. Travis, "Determinability of Model Parameters in a Two-Stage Deterministic Cancer Model," *Math. Biosci.* **146**, 1-13 (1997).

Woychik, R. P., B. Hogan, S. Bryant, G. Eichele, D. Kimelman, D. Noden, G. Schoenwolf, and C. Wright, "Pattern Formation," *Reproductive Toxicol.* **11**, 339-44 (1997).

Woychik, R. P., M. L. Klebig, M. J. Justice, T. R. Magnuson, and E. D. Avner, "Functional Genomics in the Post-Genome Era," *Mut. Res.–Fund. Mol. Mech. Mutag.* **400**, 3-14 (1998).

Woychik, R. P., M. L. Klebig, M. J. Justice, T. R. Magnuson, and E. D. Avner, "Functional Genomics in the Post-Genome Era (Vol. 400, pg. 3, 1998)," *Mut. Res.–Fund. Mol. Mech. Mutag.* **422**(2), 367 (Correction Addition)(1998).

Wu, M., E. M. Rinchik, E. Wilkinson, and D. K. Johnson, "Inherited Somatic Mosaicism Caused by an Intracisternal A Particle (IAP) Insertion in the Mouse Tyrosinase Gene," *Proc. Natl. Acad. Sci. USA* **94**, 890-94 (1997).

Xu, Y., and E. C. Uberbacher, "Automated Gene Identification in Large-Scale Genomic Sequences," *J. Comut. Biol.* **4.3**, 325-38 (1997).

Xu, Y. and E. C. Uberbacher, "2D Image Segmentation Using Minimum Spanning Trees," *Image and Vision Computing* **15**(1), 47-57 (1997).

Xu, Y., and E. C. Uberbacher, "Computational Gene Prediction Using Neural Networks and Similarity Search," in *Machine Learning and Sequence Pattern Analysis in Computational Biology*, eds. S. Salzberg, D. Searls, and S. Kasifi. Elsevier Publishing Co., New York, pp. 107-26 (1998).

Xu, Y., V. Olman, and E. C. Uberbacher, "A Segmentation Algorithm for Noisy Images: Design and Evaluation," *Pattern Recog. Lett.* **19**, 1213-24 (1998).

Xu, Y., M. B. Shah, J. R. Einstein, M. Parang, J. Snoddy, S. Petrov, V. Olman, G. Zhang, R. J. Mural, and E. C. Uberbacher, "GRAIL and GenQuest Sequence Annotation Tools," in *Proceedings of the DOE Human Genome Program – Contractor-Grantee Workshop VI, Santa Fe, New Mexico, November 9-13, 1997*, U.S. Department of Energy, pp. 77-78 (1997).

Xu, Y., D. Xu, and E. C. Uberbacher, "An Efficient Computational Method for Globally Optimal Threading," *J. Comput. Biol.* **5**(3), 597-614 (1998).

Ying, Z. C., J. G. Zhu, R. N. Compton, L. F. Allard, R. L. Hettich, and R. E. Haufler, "Synthesis of Doped Fullerene Clusters and Boron-Nitrogen Tubules Using Laser Ablation," *ACS Symposium Series* **679**, 169-82 (1997).

Yoder, B. K., W. G. Richards, C. Sommardahl, W. E. Sweeney, E. J. Michaud, J. E. Wilkinson, E. D. Avner, and R. P. Woychik, "Differential Rescue of the Renal and Hepatic Disease in an Autosomal Recessive Polycystic Kidney Disease Mouse Mutant: A New Model to Study the Liver Lesion," *Am. J. Pathol.* **150**, 2231-41 (1997).

Yuracko, K. L., S. W. Hadley, R. D. Perlack, R. G. Rivera, and T. R. Curlee, "Fernald's Dilemma: Recycle the Radioactively Contaminated Scrap Metal, or Bury It?," *Resour. Conserv. Recyclying* **19**, 187-98 (1997).

Yuracko, K. L., S. W. Hadley, R. D. Perlack, R. G. Rivera, and T. R. Curlee, "A Life Cycle Decision Methodology for Recycle of Radioactive Scrap Metal," *Life Cycle Assess.* **2**(4), 223-28 (1997).

Yuracko, K. L., M. Gresalfi, P. Yerace, J. Flora, M. Krstich, and D. Gerrick, "A Life Cycle Analysis Approact to D&D Decision-Making," in *Spectrum '98, Proceedings of the International Conference on Decommissioning and Decontamination andon Nuclear and Hazardous Waste Management*, Vol. 1, American Nuclear Society, La Grange Park, Illinois, September 13-18, 1998, pp. 53-60 (1998).

Zamora, P. O., M. J. Marek, and F. F. Knapp, Jr., "Preparation of Re-188-RC-160 Somatostatin Analog: A Peptide for Regional Radiotherapy," *Appl. Radiat. Isot.* **48**, 305-10 (1997).

Zamora, P. O., H. Bender, S. Huglke, M. J. Marek, F. F. Knapp, Jr., B. A. Rhodes, and H.-J. Biersack, "Pre-Clinical Experience with Re-188-RC-160, A Radiolabeled Somoatostatin Analog for Use in Peptide-Targeted Radiotherapy," *Anticancer Research* **17**, 1803-08 (1997).

Zeeberg, B. R., S. F. Boulay, V. K. Sood, M. R. Rayeq, R. A. Danesh, D. W. McPherson, and F. F. Knapp, Jr., "*In Vivo* Autoradiographic Competition Studies of Isomers of [I-125]IQNP Against QNB Demonstrating *In Vivo* M_2 Muscarinic Subtype Selectively for QNB," *Receptors and Signal Transduction* 7(1), 45-54 (1997).

Zeisel, D., V. Deckert, R. Zenobi, and T. Vo-Dinh, "Near-Field Surface-Enhanced Raman Spectroscopy of Dye Molecules Adsorbed on Silver Island Films," *Chem. Phys. Lett.* **283**, 381 (1998).

Zhu, Y. F., N. I. Taranenko, S. L. Allman, and C. H. Chen, "The Effect of Fragmentation on the Mass Distribution of Synthetic Polymers in MALDI-TOF Mass Spectrometry," *Rapid Commun. Mass Spectrom.* **11**, 890-97 (1997).

Zhu, Y. F., N. I. Taranenko, S. L. Allman, N. V. Taranenko, S. A. Martin, L. A. Haff, and C. H. Chen, "Oligonucleotide Sequencing by Fragmentation in Matrix Assisted Laser Desorption/Ionization – TOF Mass Spectrometry," *Rapid Commun. Mass Spectrom.* **11**, 897-903 (1997).

ORNL and Miscellaneous Reports, CY 1997–1998

Allison, D. P., *Report of Foreign Travel by D.P. Allison, July 18-25, 1997,* ORNL/FTR-6262 (1997).

Assessment ARARs and TBC Guidance for the MAG-1 Area at Fort Dix, New Jersey, ORNL/M-6284 (1998)

Assessment of ARARs for the Remediation if the Groundwater Operable Unit, Southeast industrial Area, Anniston, Army Depot, Alabama, ORNL/M-6282 (1998).

Assessment of Chemical Specific Applicable and Appropriate Requirements (ARARs) for the Northeast Corners Operable Unit at Lake City Ammunition Plant, Missouri, ORNL/M-5115 (1998).

Bast, C. B., *Data Evaluation Report, Propanil, Study Type, Oncogenicity Feeding, MRID No. 43391701,* ORNL/M-5166 (1997).

Bast, C. B., *Toxicity Summary for Aroclor 1260,* ORNL/M-5346 (1997).

Bast, C. B., *Data Evaluation Report, ABG-3097, MRID No. No. 43846506,* ORNL/M-5563 (1997).

Bast, C. B., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Chronic Oral Toxicity Feeding-Dog, MRID No. 43864248,* ORNL/M-5664 (1997).

Bast, C. B., *Data Evaluation Report, Cyfluthrin (Baythroid), Study Type, Repeated Dose Dermal - Rat (82-2) - MRID No. 44066001,* ORNL/M-5724 (1997).

Bast, C. B., *Data Evaluation Report for GA 4/7 MRID No. 44264706-08 and 44264706-10,* ORNL/M-6197 (1997).

Bast, C. B., *Data Evaluation Report, D-Allerthrin (Pynamin Forte, Study Type, Repeated Dose Dermal-Rat, MRID No. No. 44331701,* ORNL/M-6232 (1998).

Bast, C. B., *Data Evaluation Report for MEB (Tridimefon) MRID 43936101,* ORNL/M-6237 (1998).

Bast, C. B., *Proposed Acute Exposure Guideline Levels (AGELs) for 1,2-Dichloroethene,* ORNL/M-6238 (1998).

Bast, C. B., *Proposed Acute Exposure Guideline Levels (AGELs) for Phosphine,* ORNL/M-6247 (1998).

Bast, C. B., *Data Evaluation Report for Coumaphos MRID No. 26370-26379, 82524, 112832-11837, 110609, and 112616-19,* ORNL/M-6401 (1998).

Bast, C. B., *Data Evaluation Report, Permalool Plus Flea and Tick Foam, Study Type, Companion Animal Safety - Dog (86-1), MRID No. 44314009,* CHEG-000009 (1998).

Bast, C. B., *Data Evaluation Report, Permalool Plus Flea and Tick Foam, Study Type, Companion Animal Safety - Cat (86-1), MRID No. 44314010,* CHEG-000018 (1998).

Bast, C. B., *Data Evaluation Report, 2,2-Dibromo-3-nitriloptopionamide, Study Type, Primary Eye Irritation-Rabbit, MRID No. 44565004, 44565005, 44565006 and 44587208,* CHEG-000046 (1998).

Bast, C. B., *Data Evaluation Report, N-Butyl-1,2-Benzisothiazolin-3-One, Study Type, Acute Oral Toxicity-Rats, MRID No. 44364915 and 44364916,* CHEG-000047 (1998).

Bast, C. B., *Data Evaluation Report, SKW20010, Study Type, Unscheduled DNA Synthesis, MRID No. 44394619,* CHEG-000050 (1998).

Bast, C. B., *Data Evaluation Report, N-Butyl-1,2-Benzisothiazolin-3-One, Study Type, Primary Dermal Irritation - Rabbit, MRID No. 44364917,* CHEG-000053 (1998).

Bast, C. B., *Data Evaluation Report, SKW20010, Study Type, Salmonella/Mammalian Activation; Gene Mutation, MRID No. 44394620 and 44394621,* CHEG-000054 (1998).

Bast, C. B., *Data Evaluation Report, DPX-MP062 Technical, Study Type, Repeated Dose Dermal-Rat, MRID No. 44477134*, CHEG-000057 (1998).

Bast, C. B., S. Milanez, and C. S. Forsyth, *Data Evaluation Report, Dichlorvos, Study Type, Subchronic Oral Neurotoxicy, MRID No. 42958101, 42655301, 41593101, 41951501, and 40299401*, CHEG-000155 (1997).

Bast, C. B., *Data Evaluation Report, MEB 6447(Tridimefon), Study Type, Acute Oral Neurotoxicity Screening, MRID No. 43936101*, CHEG-000160 (1998).

Bast, C. B., *Data Evaluation Report, Pebulate, Study Type, Unscheduled DNA Synthesis in Rat Hepatocytes In Vivo, and Salmonella/mammalian acivation MRID No. 41614809 and 41556803*, CHEG-000164 (1998).

Bast, C. B., *Data Evaluation Report, Bioallethrin, Study Type, Micronucleus, MRID No. 001333570*, CHEG-000170 (1997).

Bast, C. B., *Data Evaluation Report, D-Allethrin, Study Type, Repeated Dose Dermal, MRID No. 44331701*, CHEG-000183 (1998).

Bast, C. B., *Data Evaluation Report, GA 4/7. BAP G/L Formulation, Study Type, Acute oral Toxicity, MRID No. 44264202-44264208*, CHEG-000186 (1997).

Bast, C. B., *Data Evaluation Report, GA, Study Type, Acute Oral Toxicity, MRID No. 44264705-10*, CHEG-000187 (1997).

Bast, C. B., *Data Evaluation Report, Oxydfluorofen, Study Type, Repeated dose Dermal, MRID No. 71915, 71916*, CHEG-000270 (1998).

Bast, C. B., *Data Evaluation Report, MCPA-DMA Salt, Study Type, Acute Oral Neurotoxocity, MRID No. 43562702*, CHEG-000328 (1998).

Beattie, K. L., *Report of Foreign Travel by K. L. Beattie, January 25-30, 1997,* ORNL/FTR-6081 (1997).

Bereolos, P. J., C. W. Forsberg, D. C. Kocher, and A. M. Krichinsky, *Strategy for Future Use and Disposition of Uranium-233: Technical Information,* ORNL/TM-13552 (1998).

Bogard, J. S., R. N. Hamm, J. C. Ashley, J. E. Turner, C. A. England, D. E. Swenson, and K. S. Brown, *Total Effective Dose Equivalent Associated with Fixed Uranium Surface Contamination,* ORNL-6913 (1997).

Bogard, J. S., R. N. Hamm, K. S. Brown, J. C. Ashley, J. E. Turner, and C. A. England, *Application of 1994-1995 USRADS Surveys of Bear Creek Valley Flood Plain and Operable Unit 1 to the Radiological Characterization of Y-12 Grassy/Wooded Areas,* ORNL-6911 (1997).

Bogard, J. S., *RADCAL Operations Manual, Radiation Control Laboratory Protocol,* ORNL-6904/R1 (1998).

Borges, H. T., *Data Evaluation Report, Penicillium Oxalicum Study Type, Acute Intravenous Toxicity-Rat, MRID No. 43973904*, ORNL/M-5555 (1997).

Borges, H. T., *Data Evaluation Report, Penicillium Oxalicum Study Type, Acute Oral Toxicity-Rat, MRID No. 43973902*, ORNL/M-5556 (1997).

Borges, H. T., *Data Evaluation Report, Penicillium Oxalicum Study Type, Acute Pulmonary Toxicity-Rat, MRID No. 43973903*, ORNL/M-5557 (1997).

Borges, H. T., *Data Evaluation Report, Fosthiozate and Metabolite 2-(BSA), Study Type, Metabolism-Rat, MRID No. 43534510*, ORNL/M-5707 (1997).

Borges, H. T., *Data Evaluation Report, Potassium Salts of Phosphorous Acid, Study Type, Cellular Immune Response-Tier 1, MRID No. 43905811*, ORNL/M-5719 (1997).

Borges, H. T., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Dermal Absorption-Rat and Human, MRID No. 43864266*, ORNL/M-5725 (1997).

Borges, H. T., *Data Evaluation Report, Penicillium Oxalicum, Study Type, Acute Oral Toxicity/Pathogenicity-Rat, MRID No. 43973902*, ORNL/M-5726 (1997).

Borges, H. T., *Data Evaluation Report, Penicillium Oxalicum, Study Type, Acute Intraperitoneal Toxicity/Pathogenicity-Rat, MRID No. 43973904*, ORNL/M-5727 (1997).

Borges, H. T., *Data Evaluation Report, Penicillium Oxalicum, Study Type, Acute Pulmonary Toxicity/Pathogenicity - Rat (152A-12) - MRID No. 43973903*, ORNL/M-5728 (1997).

Borges, H. T., *Data Evaluation Report, Gibberellic Acid, Study Type: Primary Dermal Irritation - Rabbit - MRID 44081310, 44081208, 44081104, 44081205, 44081207, 44081209, 44081311, 44081309, 44081308, 44081307, 44081306, 44081109, 44081108, 44081107, 44081106, 44081105, 44081206, 44081204)*, ORNL/M-5748 (1997).

Borges, H. T., *Data Evaluation Report, NEU 1165 M, Study Type: Iron Toxicity Review, MRID 44057801*, ORNL/M-5751 (1997).

Borges, H. T., *Data Evaluation Report, Cytoplex HMS, Study Type: Primary Eye Irritation Study (81-4), MRID 44191104*, ORNL/M-5752 (1997).

Borges, H. T., *Data Evaluation Report, Cytoplex HMS, Study Type: Primary Dermal Irritation Study (81-5) - MRID 44191103*, ORNL/M-5753 (1997).

Borges, H. T., *Data Evaluation Report, Cytoplex HMS, Study Type: Acute Dermal Toxicity Study (81-2) - MRID 44191102*, ORNL/M-5754 (1997).

Borges, H. T., *Data Evaluation Report, Cytoplex HMS, Study Type: Acute Oral Toxicity - Rat - MRID 44191101*, ORNL/M-5755 (1997).

Borges, H. T., *Data Evaluation Report, Agroneem, Study Type: Primary Eye Irritation - Rabbit, MRID - 44146907*, ORNL/M-5756 (1997).

Borges, H. T., *Data Evaluation Report, Agroneem, Study Type, Primary Dermal Irritation - Rabbit, MRID No. - 44146906*, ORNL/M-5757 (1997).

Borges, H. T., *Data Evaluation Report, Agroneem, Study Type, Mucous Membrane Irritation Study - MRID No. 44146905*, ORNL/M-5758 (1997).

Borges, H. T., *Data Evaluation Report, Agroneem, Study Type, Primary Dermal Irritation - Rabbit, MRID No. 44146904*, ORNL/M-5759 (1997).

Borges, H. T., *Data Evaluation Report, Agroneem, Study Type, Acute Dermal Toxicity - Rat, MRID No. 44146903*, ORNL/M-5760 (1997).

Borges, H. T., *Data Evaluation Report, Agroneem, Study Type, Acute Oral Toxicity - Rat, MRID No. 44146902*, ORNL/M-5761 (1997).

Borges, H. T., *Data Evaluation Report, Agroneem, Study Type, Acute Oral Toxicity - Mouse, MRID No. - 44146901*, ORNL/M-5762 (1997).

Borges, H. T., *Data Evaluation Report, Iron Phosphate, Study Type, Primary Eye Irritation-Rabbit, MRID No. 44042706*, ORNL/M-5763 (1997).

Borges, H. T., *Data Evaluation Report, Iron Phosphate, Study Type, Acute Dermal Toxicity-Rat, MRID No. 44042705*, ORNL/M-5764 (1997).

Borges, H. T., *Data Evaluation Report, Iron Phosphate, Study Type, Acute Oral Toxicity-Rat, MRID No. 44042704*, ORNL/M-5765 (1997).

Borges, H. T., *Data Evaluation Report, Iron Phosphate, Study Type, Primary Dermal Irritation-Rabbit, MRID No. 44042707*, ORNL/M-5766 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Dermal Sensitization, Guinea Pig, MRID No. 44075848*, ORNL/M-5773 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Primary Dermal Irritation-Rabbit, MRID No. 44075844*, ORNL/M-5774 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Dermal Sensitization, MRID No. 44075847*, ORNL/M-5775 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Primary Dermal Irritation, MRID No. 44075845*, ORNL/M-5776 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Dermal Sensitization, MRID No. 44075846*, ORNL/M-5777 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Primary Eye Irritation, MRID No. 44075843*, ORNL/M-5778 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Primary Eye Irritation, MRID No. 44075842*, ORNL/M-5779 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Acute Inhalation Toxicity-Rat, MRID No. 44075841*, ORNL/M-5780 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Acute Inhalation Toxicity-Rat, MRID No. 44075840*, ORNL/M-5781 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Acute Dermal Toxicity-Rat, MRID No. 44075839*, ORNL/M-5782 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Acute Dermal Toxicity-Rat, MRID No. 44075838*, ORNL/M-5783 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Acute Oral Toxicity-Rat, MRID No. 44075837*, ORNL/M-5784 (1997).

Borges, H. T., *Data Evaluation Report, DuPont R6447, Study Type, Acute Oral Toxicity-Rat, MRID No. 44075836*, ORNL/M-5786 (1997).

Borges, H. T., *Data Evaluation Report for NOVAGIB Technical MRID No. 44344801, 4264701-04*, ORNL/M-6198.

Borges, H. T., *Data Evaluation Report, Gliocladium, Study Type, Acute Eye Irritation, Dermal Toxicity, Pulmonary Toxicity, Hypersensitivity, Oral Toxicity, MRID No. 44189311-12, 44189314, and 44189316-17*, ORNL/M-6277 (1997).

Borges, H. T., *Data Evaluation Report, Trifkuralin, Study Type, Acute Oral and Dermal Toxicity, Primary Eye and Dermal Irritation, Dermal Sensitization, MRID No. 44241101-05*, ORNL/M-6279 (1998).

Borges, H. T., *Data Evaluation Report for Thiophanate Methyl*, ORNL/M-6287 (1998).

Borges, H. T. and J. C. Norris, *Data Evaluation Report for A-9497B, MRID 44160201-06*, ORNL/M-6288 (1998).

Borges, H. T. and J. C. Norris, *Data Evaluation Report for MFP-PG-56, MRID 44079901-06*, ORNL/M-6290 (1998).

Borges, H. T., *Data Evaluation Report, MFP-PG-56, Study Type: Dermal Sensitization - Guinea Pig - MRID 44079906, 44079905, 44079904*, ORNL/M-6411 (1998).

Borges, H. T., *Data Evaluation Report, A-9497B, Study Type: Primary Dermal Irritation - Rabbit - MRID 44160204, 44160203, 44160202, 44160201*, ORNL/M-6412 (1998).

Borges, H. T., *Data Evaluation Report, A-9497B, Study Type: Dermal Sensitization (81-6) - MRID 44160205 R93-506,* ORNL/M-6413 (1998).

Borges, H. T., *Data Evaluation Report, Isazofos, Study Type: Acute Oral Toxicity - Rat - MRID 43548301 ,* ORNL/M-6415 (1998).

Borges, H. T., *Data Evaluation Report for DuPont R6447, Study Type, Metabolism, Rat, (85-1), MRID No. 44306208, Primary Eye Irritation – Rabbie – MRID 43548302,* ORNL/M-6416 (1998).

Borges, H. T., *Data Evaluation Report for CRY9C Protein MRID No. 44384302-03, 44161701, and 44384301,* ORNL/M-6417 (1998).

Borges, H. T., *Data Evaluation Report for Pyrocide Intermediate 7070, Study Type,s Acute Oral, Dermal, and Inhalation, Eye and Dermal Irritation, and Dermal Sensitization, MRID No. 43074101-06,* ORNL/M-6420 (1998).

Borges, H. T., *Data Evaluation Report for Themac Game Stop MRID 44241101-05,* ORNL/M-6495 (1998).

Borges, H. T., *Data Evaluation Report for Gliocladium MRID 44189311-12, 44189314, 44189316-17,* ORNL/M-6496 (1998).

Borges, H. T., *Data Evaluation Report for Novagib Technical MRID No. 44344801, 4264701-04,* ORNL/M-6503 (1998).

Borges, H. T., *Collection and Verification of Matched Data from Selected United States Cancer and HIV/AIDS Registeries* (1998).

Borges, H. T., *Data Evaluation Report, Ecoloflex Paint, Study Type, Dermal Irritation - Rabbit, MRID No. 44587205,* CHEG-000001 (1998).

Borges, H. T., *Data Evaluation Report, N-Butyl-1,2,-Benzisothazolin-3-one, Study Type, Primary Dermal Irritation-Rabbit MRID No. 44364917,* CHEG01 (1998).

Borges, H. T., *Data Evaluation Report, Ecoloflex Paint Study Type, Dermal Irritation - Rabbit,* CHEG-000002 (1998).

Borges, H. T., *Data Evaluation Report. Ecoloflex Paint tudy type Acute Oral Toxicity - Rats,* CHEG-000003 (1998).

Borges, H. T., *Data Evaluation Report, N-Butyl, -1,2-Benzisothazolin-3-0ne, Study Type, Acute Oral Toxicity-Rats,* CHEG-000004 (1998).

Borges, H. T., *Data Evaluation Report, N-Butyl-1,2-Benzisothiazolin-3-One, Study Type, Acute Oral Toxicity - Rats,* CHEG-000005 (1998).

Borges, H. T., *Data Evaluation Report, Ecoflex Paint, Study Type, Acute Oral Toxicity - Rats MRID No. 44587202, 44587206-07, 44364919,* CHEG-000006 (1998).

Borges, H. T., *Data Evaluation Report, N-Cyclopropyl-N-(1,1-Dimethylethyl)-6-(Methylothio)-1,3,5-Triazine-2,224,-Diamine, Study Type, Dermal Sensitization, MRID No. 44596107,* CHEG-000092 (1998).

Borges, H. T., *Data Evaluation Report, Calcium Hypochlorite, Study Type, Acute Inhalation Toxicity MRID No. 44622403-44622405,* CHEG-000093 (1998).

Borges, H. T., *Data Evaluation Report, Alkul Dimethyl Benzyl Ammonium Chloride, Study Type, Acute Oral Toxicity, Primary, Dermal, Eye Irritation MRID No. 44629101-44629103, 44602406 and 44602407,* CHEG-000094 (1998).

Borges, H. T., *Data Evaluation Report, Calcium Hypochlorite, Study Type, Acute Oral Toxicity MRID No. 44622402,* CHEG-000095 (1998).

Borges, H. T., *Data Evaluation Report, Dihydroazadirachtin, Study Type, Acute Inhalation, MRID No. 43817401,* CHEG-000100 (1998).

Borges, H. T., *Data Evaluation Report, Busan 1157, Study Type, Metabolism, MRID No. 44016816*, CHEG-000107 (1998).

Borges, H. T., *Data Evaluation Report, Thiophanate Methyl, Study Type, Special Thyroid and Liver Mechanistic Studies*, CHEG-000112 (1998).

Borges, H. T., *Data Evaulation Report, Pentachloronitrobenzene, Study Type, Mechanictic Studies of Chemically-Induced Hypothyroidism by Pentachloronitrobenzene, MRID No. 44096601*, CHEG-000115 (1998).

Borges, H. T., *Data Evaluation Report, R93-506, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization. MRIG 43340901-43340906*, CHEG-000124 (1998).

Borges, H. T., *Data Evaluation Report, n-Decanol, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization. MRIG 44460401-44460406*, CHEG-000128 (1998).

Borges, H. T., *Data Evaluation Report, Diazinon 5G, Study Type,s Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 43009301-43009306*, CHEG-000138 (1998).

Borges, H. T., *Data Evaluation Report, Diazinon, Study Type,s Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 42993301-42993306*, CHEG-000139 (1998).

Borges, H. T., *Data Evaluation Report, A-9497B, Study Type, Dermal Sensitization, MRID No. 44160205*, CHEG-000140 (1997).

Borges, H. T., *Data Evaluation Report, MFG-PG-56, Study Type,s Acute Oral Toxicity, MRID No. 44079904-44079906*, CHEG-000141 (1997).

Borges, H. T., *Data Evaluation Report, A-9497B, Study Type, Acute oral Toxicity, MRID No. 44160201-44160204*, CHEG-000142 (1997).

Borges, H. T., *Data Evaluation Report, SBP-1382, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 43201601, 43201603-43201605*, CHEG-000149 (1998).

Borges, H. T., *Data Evaluation Report, SKW20010, Study Type, Dermal Sensitization, MRID No. 44394606-44394610, 44394615 and 44359529*, CHEG-000165 (1998).

Borges, H. T., *Data Evaluation Report, Novagib Technical, Study Type, Certification of Limits and Analytical Methods for Certified Limits, MRID No. 44344801, 44264701, 44264201, 44264702, 44264703-4*, CHEG-000199 (1997).

Borges, H. T., *Data Evaluation Report, Chloroxylenol, Study Type, Primary Eye Irritation, MRID No. 137441,137440, 92252, 137438, 137442,41886601, 137439*, CHEG-000275 (1998).

Borges, H. T., *Data Evaluation Report, Soap/Obenzyl, Study Type, Acute Oral Toxicity, MRID No. 44424301, 44424302, 44424303, 44424305, 44424304*, CHEG-000302 (1998).

Borges, H. T., and S. S. Chang, *Data Evaluation Report, O-Phenylpenol, Study Type, Dermal Sensitization, MRID No. 44396605., 44396603, 44396604, 44345101, 44397202*, CHEG-000319 (1998).

Borges, H. T., C. S. Forsyth, and S. S. Talmage, *Data Evaluation Report, Chlorphrifos, Study Type, Cholinesterase and Metabolite Determination, Blood Time Course, Cognitive Neuerootoxcity, MRID No. 44020901*, CHEG-000324 (1998).

Borges, H. T., *Data Evaluation Report, Nipacide, Study Type, Acute Oral Toxicity, MRID No. 41738901*, CHEG-000349 (1998).

Borges, H. T., *Data Evaluation Report, Sodium Dichloroisocyanurate Dihydrate, Study Type, Acute Inhalation Toxicity, MRID No. 44509201, 44509202*, CHEG-000362 (1998).

Brothers, R. A., *Data Evaluation Report, Aerosol Surface Disinfectant, Study Type, Physical and Chem. Char., Enforc. Analytical Met., Cert. Limits, and Formation of Impur., MRID No. 44212301*, CHEG-000011 (1998).

Brothers, R. A., *Data Evaluation Report, Mildew Check, Study Type, Physical and Chemical Characteristics, Density and Flammability, MRID No. 44486001-03*, CHEG-000012 (1998).

Brothers, R. A., *Data Evaluation Report, Mistolin, Study Type, Description of Beginning Materials & Manufacturing Process, MRID No. 44543701*, CHEG-000037 (1998).

Brothers, R. A., *Data Evalution Report, Mistolin, Study Type, Description of Beginning Materials & Manufacturing Process, MRID No. 44543701*, CHEG-000038 (1998).

Brothers, R. A., *Data Evaluation Report, Mistolin, Study Type, Descriptions of Beginning Materials & Manufacturing Process, MRID No. 44543701*, CHEG-000039 (1998).

Brothers, R. A., *Data Evaluation Report, PPG Performance Blend, Study Type, Product Identity and Disclosure of Ingredients, MRID No. 44622401*, CHEG-000045 (1998).

Brothers, R. A., *Data Evaluation Report, Mistolin, Study Type, Description of Beginning Materials & Manufacturing Process MRID No. 44534701*, CHEG-000089 (1998).

Brothers, R. A., *Data Evaluation Report for Tamko 212, MRID No. 4467620-03, Study Type, Product Identity/Disclosure of Ingredients, DESC./Manufacturing Process, Discussion Impurities, Prieliminary Analysis, and Physical/Chemical Characteristics*, CHEG-000224 (1998).

Brothers, R. A., *Data Evaluation Report for Zeomic Type AJ10N Silver Zeolite A, MRID No. 44622201, 44677801, and 44677701 Study Type, Product Identity/Disclosure of Ingredients*, CHEG-000226 (1998).

Brothers, R. A., *Data Evaluation Report, Cacodylate 3.25, Study Type, Subchronic Inhalation Toxicity*, CHEG-000261 (1998).

Brothers, R. A., *Data Evaluation Report, BQ 621-5 Biocide, Study Type, Product Identify and Disclosure of Ingredients, Description of Beginning Materials & Manufacturing Process. MRID No. 44671001 and 44671002*, CHEG-000282 (1998).

Brothers, R. A., *Data Evaluation Report, BQ 361-5 Biocide, Study Type, Product Identify and Disclosure of Ingredients, Description of Beginning Materials & Manufacturing Process. MRID No. 44670401 and 44670402*, CHEG-000283 (1998).

Brothers, R. A., *Data Evaluation Report, BEQ 442-5 Biocide, Study Type, Product Identify and Disclosure of Ingredients, Description of Beginning Materials & Manufacturing Process. MRID No. 44670601 and 44670602*, CHEG-000284 (1998).

Brothers, R. A., *Data Evaluation Report, BEQ 442-8 Biocide, Study Type, Product Identify and Disclosure of Ingredients, Description of Beginning Materials & Manufacturing Process. MRID No. 44670701 and 44670702*, CHEG-000285 (1998).

Brothers, R. A., *Data Evaluation Report, BEQ 451-5 Biocide, Study Type, Product Identify and Disclosure of Ingredients, Description of Beginning Materials & Manufacturing Process. MRID No. 44670501 and 44670502*, CHEG-000286 (1998).

Brothers, R. A., *Data Evaluation Report, BEQ 451-8 Biocide, Study Type, Product Identify and Disclosure of Ingredients, Description of Beginning Materials & Manufacturing Process. MRID No. 44671101, 44671102*, CHEG-000287 (1998).

Brothers, R. A., *Data Evaluation Report, BEQ 1416-5 Biocide, Study Type, Product Identify and Disclosure of Ingredients, Description of Beginning Materials & Manufacturing Process. MRID No. 44670101 and 44670102*, CHEG-000288 (1998).

Brothers, R. A., *Data Evaluation Report, BQ 1416-8 Biocide, Study Type, Product Identify and Disclosure of Ingredients, Description of Beginning Materials & Manufacturing Process. MRID No. 44670801, 44670802*, CHEG-000289 (1998).

Brothers, R. A., *Data Evaluation Report, Ripener 1 Concentrate, Study Type, Product Identity and Disclosure of Ingredients, MRID Nos. 44468001, 44468002*, CHEG-000332 (1998).

Brothers, R. A., *Data Evaluation Report, Biosol, Study Type, Product Identity and Disclosure of Ingredients, MRID No. 44039401, 44039402*, CHEG-000333 (1998).

Brothers, R. A., *Data Evaluation Report, Dichlormid, Study Type, Subchronic Oral Toxicity Feeding, MRID No. 225002429*, CHEG-000291 (1998).

Brothers, R. A., *Data Evaluation Report, Softsoak, Study Type, Product Identity and Disclosure of Ingredients, MRID No..44438601, 44438602, 44438603, 44438604*, CHEG-000331 (1998).

Brothers, R. A., *Data Evaluation Report, Mistolin, Study Type, Physical and Chemical Characteristics, MRID No. 44543704, 44543702*, CHEG-000334 (1998).

Brothers, R. A., *Data Evaluation Report, BCP Disinfectant, Study Type, Certified Limits, MRID No. 44516901*, CHEG-000335 (1998).

Brothers, R. A., *Data Evaluation Report, H2Orange2Super Concentrate 112, Study Type,s Formulation of Impurities and Storage Stability, MRID No. 44646001*, CHEG-000336 (1998).

Brothers, R. A., *Data Evaluation Report, Ultra-Kleen CW-502, Study Type, Product Chemistry Discussion, MRID No. 44657501*, CHEG-000337 (1998).

Brothers, R. A., *Data Evaluation Report, Bioclear 1050 Fizzy Tabs, Study Type, Physical and Chemical Characteristics, MRID No. 44652101*, CHEG-000338 (1998).

Brothers, R. A., *Data Evaluation Report, Bacto-loob, Study Type, Physical and Chemical Characteristics, MRID No. 44424306*, CHEG-000339 (1998).

Brothers, R. A., *Data Evaluation Report, Oxyclear, Study Type, Product Identity and Composition, MRID No. 44658301*, CHEG-000340 (1998).

Brothers, R. A., *Data Evaluation Report, Hospital Broad Band, Study Type,s Product Identity and Disclosure of Ingredients, MRID No. 40937406*, CHEG-000341 (1998).

Brothers, R. A., *Data Evaluation Report, Kwikkill, Study Type, Product Identity and Composition, MRID No. 44582701*, CHEG-000348 (1998).

Brothers, R. A., *Data Evaluation Report, PPG Performance Blend, Study Type, Product Identity and Disclosure of Ingredients, MRID No. 44622401*, CHEG-000350 (1998).

Brothers, R. A., *Data Evaluation Report, Amphyl Disinfectant Deodorant Spray, Study Type, Product Identity and Disclosure of Ingredients, MRID No. 44037901*, CHEG-000351 (1998).

Brothers, R. A., *Data Evaluation Report, Ocide, Study Type, Product Identity, MRID No. 44473202*, CHEG-000352 (1998).

Brothers, R. A., *Data Evaluation Report, Hospi Spray Disinfectant, Study Type, Description of Process, MRID No. 44492201*, CHEG-000353 (1998).

Brothers, R. A., *Data Evaluation Report, Lysol Brand Disinfectant Spray, Study Type, Analysis and Certification of Product, MRID No. 44038102 and 44038101*, CHEG-000354 (1998).

Brothers, R. A., *Data Evaluation Report, Concept Hospital Disinfectant Deodorant, Study Type, Physical and Chemical Characteristics, MRID No. 44418501*, CHEG-000355 (1998).

Brothers, R. A., *Data Evaluation Report, ZEP Refresh II, Study Type, Product Identity and Disclosure of Ingredients, MRID No. 43988601*, CHEG-000356 (1998).

Brothers, R. A., *Data Evaluation Report, Emulso Germicidal Bowl Cleaner, Study Type, Product Identity and Disclosure of Ingredients, MRID No. 43907301*, CHEG-000357 (1998).

Brothers, R. A., *Data Evaluation Report, Herpicide Spray, Study Type, Description of Manufacturing Process, MRID No. 41406305, 43877301*, CHEG-000358 (1998).

Brothers, R. A., *Data Evaluation Report, PVP Iodine 30/60, Study Type, Product Identity and Disclosure, MRID No. 44622901-3*, CHEG-000359 (1998).

Caton, G. M., *Data Evaluation Report, Multicide Intermediate 2747, Study Type, Acute Oral, Dermal, and Inhalation Toxicity, Primary Eye and Dermal Irritation, Dermal Sensitization, MRID No. 44395901-06*, ORNL/M-6265 (1998).

Chang, S. S., *Data Evaluation Report for Dibromodicyanobutane, MRID 44290202-04 and 44241501*, ORNL/M-6251 (1998).

Chang, S. S., *Data Evaluation Report for Chlorpyrifos,Study Type, Acute Oral, Dermal, and Inhalation Toxicity, Primary Eye and Dermal Irritation, Dermal Sensitization, MRID 44324201-06*, ORNL/M-6252 (1998).

Chang, S. S., *Data Evaluation Report for Raid Ant and Roach 17 Minus Propellant, MRID 43818603-06 and 43847101-02* , ORNL/M-6253 (1998).

Chang, S. S., *Data Evaluation Report for Penimethalin, MRID 44294505-09*, ORNL/M-6254 (1998).

Chang, S. S., *Data Evaluation Report for Ammoniuym Salts of C-18 and C18' Fatty Acids, MRID 44365604-09*, ORNL/M-6258 (1998).

Chang, S. S., *Data Evaluation Report for Clethodim, MRID 44360301-06*, ORNL/M-6259 (1998).

Chang, S. S., *Data Evaluation Report, Bicep Magnum, (CGA-77102/G-30027 660SC-EXP) Acute Oral, Dermal, Inhalation, Eye Irritation, Dermal Irritation, and Primary Dermal Sensitization, MRID No. 44341703-08*, ORNL/M-6260 (1998).

Chang, S. S., *Data Evaluation Report for Lambda-Cyhalothrin, MRID 44355603-08*, ORNL/M-6261 (1998).

Chang, S. S., *Data Evaluation Report for Permethrin Mixed CIS TRANS and 2-(methyl-1-(phenoxyphenoxy)ethoxy)pyridine, MRID 44329702-06*, ORNL/M-6264 (1998).

Chang, S. S., *Data Evaluation for Multicide, MRID 44395901-06* , ORNL/M-6265 (1998).

Chang, S. S., *Data Evaluation Report for Butalate, MRID 43309901-06*, ORNL/M-6266 (1998).

Chang, S. S., *Data Evaluation Report for Ziram, MRID 41442001, 41442003, 41454401, 41454601, 41340401, and 41340402*, ORNL/M-6269 (1997).

Chang, S. S., *Data Evaluation Report for Orthioquinox, MRID 44141604*, ORNL/M-6270 (1997).

Chang, S. S., *Data Evaluation Report for Ziram, MRID 41454601-02, 43701301, 41340401-02* , ORNL/M-6279 (1997).

Chang, S. S., *Data Evaluation Report for Sodium Dimethyl Dithiocarbamate, MRID 132380, 159782-83, 161195, 160993-05*, ORNL/M-6280 (1997).

Chang, S. S., *Data Evaluation Report for TRA 0201, MRID 44433002-07; BAS 589 03 H, MRID 44322205-04; Terraclor MRID 4372601-04; Diazanon MRID 43003901; and CGA-77102 II, MRID 44395403-08* , ORNL/M-6292.

Chang, S. S., *Data Evaluation Report for Scorcher, MRID 44392603; Cobra, MRID 44396802; PCNB, MRID 43759901-06,* ORNL/M-6293 (1998).

Chang, S. S., *Data Evaluation Report for Trifluralin, MRID 40103101-06; MRID 40405001-06; MRID 41233605-09; 41993805-09,* ORNL/M-6294 (1998).

Chang, S. S., *Data Evaluation Report for Trifluralin, MRID 40164401-06; MRID 40822201-02, 138224; MRID 1308537 and 137468; 43462304-09,* ORNL/M-6295 (1998).

Chang, S. S., *Data Evaluation Report, Butalate, Study Type, Acute Oral, Dermal, and Inhalation Toxicity, Primary Eye Irritation and Dermal Sensitization, MRID No. 43309901-06,* ORNL/M-6350 (1998).

Chang, S., *Data Evaluation Report for SKW20010 (CN-11-3183) MRID No. 44359529, 44394606-44394611 and 44394615* , ORNL/M-6397.

Chang, S. S., *Data Evaluation Report for Trichlorofon MRID No. 44479401-05, 44479409-11, 4151302, 40306901, 40654306,* ORNL/M-6405.

Chang, S. S., *Data Evaluation Report for Dimethomorph, MRID 44175304 and 60401387,* ORNL/M-6408 (1998).

Chang, S. S. and H. T. Borges, *Data Evaluation Report for SPB-1382, Pyrocide, Diazinon, Multicide, Methiocarb MRID No. 43009301-06, 42993301-06, 43074101-06,43201601-06, 44472401-04, 44513301-06, 40518101-04, 145388, 40518105, 40658402,* ORNL/M-6420 (1998).

Chang, S. S., *Data Evaluation Report for Omite, Mosquito Beater, Dimethomorph/Mancozeb 90/600 WDG, Peroxy Compounds, Methyl Nonyl Ketone,, CGA-173506/CGA 329351 2.7FS, Dicamba Sodium Salt, Deet Insect Repelent, Everside Wasp and Hornet Killer 2577, FOE 5043/IFT 75 WG, 97-002, EH-1349, and R93-506* , ORNL/M-6421.

Chang, S. S., *Data Evaluation Report for N,N-Diethyl-meta-toluamide and other Isomers MRID 44312901-06,* ORNL/M-6501.

Chang, S. S., C. Troxel, B. Whitfield, and A. A. Francis, *Data Evaluation Report for R93-506, Phosphine, n-Decanol, CGA-248757, Nitrapyrin, Xentari WDG, Pentachloronitrobenzene, Busan 1157, Avermectin, Dithianon, Sodium Dimethyldithiocarmate, BL-1157, and 1,2-Ethanediamine, Polimer,* ORNL/M-6584.

Chang, S. S., *Data Evaluation Report, Diflubenzuron, Study Type, Acute Oral, Dermal, and Inhalation Toxicity, Primary Eye and Dermal Toxicity, and Dermal Sensitization, MRID No. 44574504-09,* CHEG-000024 (1998).

Chang, S. S., *Data Evaluation Report, Betacypermethrin 10EC, Study Type, Acute Oral and Dermal Toxicity, Primary Eye and Dermal Irritation, Dermal Sensitization, MRID No. 44544203-07,* CHEG-000026 (1998).

Chang, S. S., *Data Evaluation Report, Evercide Nylar, Pressurized Pet Spray 2642, Study Type, Acute Oral, Dermal, and Inhalation Toxicity, Primary Eye and Dermal Irritation, and Dermal Sensitization, MRID No. 44548101-06,* CHEG-000028 (1998).

Chang, S. S., *Data Evaluation Report, CGA-136872/Dicamba 50 WG, Study Type, Acute Oral, Dermal, and Inhalation Toxicity, Primary Eye and Dermal Irritation, and Dermal Sensitization, MRID No. 44564204,* CHEG-000030 (1998).

Chang, S. S., *Data Evaluation Report, Glyphosate Acid, Acute Oral, Dermal, and Inhalation Toxicity, Primary Eye and Dermal Irritation and Dermal Sensitization, MRID No. 44497001-06,* CHEG-000032 (1998).

Chang, S. S., *Data Evaluation Report, BIS(Tributyltin)Oxide (Coronado Preservative Wood Stain) Study Type, Primary Dermal Irritation-Rabbit, MRID No. 44593502,* CHEG-000041 (1998).

Chang, S. S.., *Data Evaluation Report, Bis(Tributyltin) Oxide (Coronado Preservative Wood Stain) Study Type, Primary Dermal Irritation-Rabbit, MRID No. 44593502,* CHEG-000042 (1998).

Chang, S. S., *Data Evaluation Report, Bis(Tributyltin) Oxide (Coronado Preservative Wood Stain), Study Type, Acute Dermal Toxicity-Rabbit, MRID No. 44593503*, CHEG-000043 (1998).

Chang, S. S., *Data Evaluation Report, Pyrocide ULV Concentrate7434, Study Type, Acute Oral, Dermal, and Inhalation Toxicity, Primary Eye and Dermal Irritation, and Dermal Sensitizatiton, MRID No. 44546801-06*, CHEG-000044 (1998).

Chang, S. S., *Data Evaluation Report, Bis(Tributyltin) Oxide (Coronado Preservative Wood Stain), Study Type, Primary Dermal Irritation-Rabbit, MRID No. 44593502, 44593503 and 44593504*, CHEG-000061 (1998).

Chang, S. S., *Data Evaluation Report, Vancide, Acute Oral Toxicity-Rat, Acute Inhalation Toxicity-Rat, Dermal Sensitization-Guinea Pig, MRID No. 41773701, 42406101 and 41620501*, CHEG-000062 (1998).

Chang, S. S., *Data Evaluation Report, Prometryn, Acute Toxicity One-Liners (81-1 through 81-6),MRID No. s 40457508/44271305, 40457509/ and 44271307, 44271310, 40457511/44271311, 40457513/ 44271313, and 44271316*, CHEG-000063 (1998).

Chang, S. S., *Data Evaluation Report, Prometryn (Caparol 4L Herbcide), Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 44271306, 44271308, 44271309, 44271312, 44271314 and 44271315*, CHEG-000064 (1998).

Chang, S. S., *Data Evaluation Report, Mepiquat Chloride (Bas 083 28 w), Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization.MRID No. 42554105-42554110*, CHEG-000066 (1998).

Chang, S. S., *Data Evaluation Report, 4-CPA, Acute Dermal Toxicity-Rabbit and Acute Inhalation Toxicity-Rat, MRID No. 45522601, 42968201*, CHEG-000067 (1998).

Chang, S. S., *Data Evaluation Report, Pyrocide Flea & Tick Shampoo 51921, Study Type,s Acute, Oral, Dermal, Inhalation Toxicity, Primary Eye, and Dermal Irritation Dermal Sensitization, MRID No. 44539101- 4539107*, CHEG-000082 (1998).

Chang, S. S., *Data Evaluation Report, CHA 7125, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization. MRID No. 44270102-44270107*, CHEG-000083 (1998).

Chang, S. S., *Data Evaluation Report, EVITAL 5G, Study Type,s Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization. MRID No. 44549501*, CHEG-000084 (1998).

Chang, S. S., *Data Evaluation Report, Reppers Grain Repellent, Study Type, Acute Oral, Dermal Toxicity, Dust Generation Feasibility, Primary Eye, Dermal Irritation and Dermal Sensitization. MRID No. 44352804-44352809*, CHEG-000086 (1998).

Chang, S. S., *Data Evaluation Report, RUC 1769 (Delta Methrin 0.06% RTU GEL, Study Type, Acute Oral, Dermal and Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization. MRID No. 244542504-44542509*, CHEG-000087 (1998).

Chang, S. S., *Data Evaluation Report, Prometryne (Prometryne & MSMA Herbicide), Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization, MRID No. 44529602-44529607*, CHEG-000104 (1998).

Chang, S. S., *Data Evaluation Report, Cobra 3 EC, Study Type, Primary Eye and Dermal Irritation, MRID No. 44396802*, CHEG-000108 (1998).

Chang, S. S., *Data Evaluation Report, Bromacil (Liquid Ureabor), Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary eye, Dermal Irritation, Dermal Sensitization MRID No. 43685207 and 42098601*, CHEG-000109 (1998).

Chang, S. S., *Data Evaluation Report, Chloropropham (Pin Nip 98.6% Chlorpropham), Study Type, Acute Oral, Dermal Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization MRID No. 44338303*, CHEG-000110 (1998).

Chang, S. S., *Data Evaluation Report, PCNB 2 Flowable, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 43759901*, CHEG-000111 (1998).

Chang, S. S., *Data Evaluation Report, Sorcher Total Vegetation Killer,Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization, MRID No. 44392603*, CHEG-000114 (1998).

Chang, S. S., *Data Evaluation Report, Methyl Nonyl Ketone (Boundary Concentrate), Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 44144802*, CHEG-000117 (1998).

Chang, S. S., *Data Evaluation Report, CGA-173506/CGA-329351 2.7FS, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization. MRIG 4443703-4443708*, CHEG-000118 (1998)

Chang, S. S., *Data Evaluation Report, Dicamba Sodium Salt, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization. MRID Nos. 44524403-08*, CHEG-000119 (1998).

Chang, S. S., *Data Evaluation Report, Deet Insect Repellent 30, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization. MRID 44522403-44522408*, CHEG-000120 (1998).

Chang, S. S., *Data Evaluation Report, Evercide Wasp & Hornet Killer 2577 (Revised), Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization, MRID 44526901-44526906*, CHEG-000121 (1998).

Chang, S. S., *Data Evaluation Report, FOE 5043/IFT 75 WG, IFT 58 WG, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization. MRID 44525507, 44525504, 44525508, 44525502-44525506*, CHEG-000122 (1998).

Chang, S. S., *Data Evaluation Report, EH-1349, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization. MRID 44463601-44463608*, CHEG-000123 (1998).

Chang, S. S., *Data Evaluation Report, 97-022,Study Type, Acute Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization. MRID 44461002-44461005*, CHEG-000125 (1998).

Chang, S. S., *Data Evaluation Report, Cobra 3 EC, Primary Eye Irritation, Primary Dermal Irritation, MRID No. 44396802 and 44396803*, CHEG-000133 (1998).

Chang, S. S., *Data Evaluation Report, PCNB 2 FLOWABLE, Acute Oral, Dermal Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization. MRID No. 43759901-43759906*, CHEG-000134 (1998).

Chang, S. S., *Data Evaluation Report, Bromacil, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye and Dermal Irritation, MRID No. 44096101, 41304103 and 44488327*, CHEG-000145 (1998).

Chang, S. S., *Data Evaluation Report, Trichlorfon, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization. MRID No. 43259201, 44479402 and 44479409*, CHEG-000147 (1998).

Chang, S. S., *Data Evaluation Report, Multicide Intermediate 2745, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 44472401, 44438301, 44472402, 44438302-44438304*, CHEG-000148 (1998).

Chang, S. S., *Data Evaluation Report, Multicide Concentrate 2751 (Rev. 1) MGK GLP PROJECT 1110-LAB PREPARED. MRID No. 44513301-44513306*, CHEG-000151 (1998).

Chang, S. S., *Data Evaluation Report, Tetrachlorovinphos, Study Type, Acute Oral, Dermal Toxicity, Primary eye, dermal irritation, and dermal sensitization. MRID No. 40701901, 40701903-40701905, 42576000-42576001, 41778601-41778602, 43010801*, CHEG-000166 (1998).

Chang, S. S., *Data Evaluation Report, RUC 1574, RUC 1571, Study Type,s Acute Oral, Dermal and Inhalation Toxicity, Primary Eye, Dermal Irritation, and Dermal Sensitization, MRID No. 44446604-44446609, 44446104-44446110, 44445904-44445910*, CHEG-000167 (1998).

Chang, S. S., Data *Evaluation Report, RUC 1569, 1573, 412, 415 Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitation, MRID No. 44445904-10, 44446404-10, 43261201-6, 43261001-6*, CHEG-000168 (1998).

Chang, S. S., *Data Evaluation Report, Diquat Dibromide, Study Type, Acute Oral, Dermal Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization. MRID No. 40210402-7*, CHEG-000174 (1998).

Chang, S. S., *Data Evaluation Report, Multicide Intermediate 2747, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization, MRID No. 44395901-6*, CHEG-000178 (1997).

Chang, S. S., *Data Evaluation Report, Lambda-Cyhalothrin, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitation, MRID No. 44355603-8*, CHEG-000180 (1998).

Chang, S. S., *Data Evaluation Report, Butylate, Study Type, Acute Oral, Dermal, Inhalation, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 43309901-6*, CHEG-000181 (1998).

Chang, S. S., *Data Evaluation Report, N,N-Diethyl-Meta-Toluamide and Other Isomers, MRID No. 44312901-6*, CHEG-000182 (1998).

Chang, S. S., *Data Evaluation Report, Raid Ant and Roach 17 Minus Propellant, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization. MRID No. 43818602-6*, CHEG-000191 (1998).

Chang, S. S., *Data Evaluation Report, Bicep Magnum, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 44341703-8*, CHEG-000193 (1998).

Chang, S. S., *Data Evaluation Report, Oxythiquinox, Study Type, Primary Eye Irritation, MRID No. 44141604*, CHEG-000195 (1997).

Chang, S. S., *Data Evaluation Report, Ammonium Salts of C8-18 and C18' Fatty Acids, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 44365604-9*, CHEG-000196 (1998).

Chang, S. S., *Data Evaluation Report, Dibromodicyanobutane, Study Type, Acute Oral, Dermal Toxicity, Primary Eye and Dermal Irritation, MRID No. 44290202-4, 44241501, 44289902-4, 44241701, 44290602-5, 44290302-4, 44241201*, CHEG-000197 (1998).

Chang, S. S., *Data Evaluation Report, Coumaphos, Study Type, Acute Oral, Dermal Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 110609, 112816, 112818-20, 110597-8, 110601, 110599-110600, 110602*, CHEG-000202 (1998).

Chang, S. S., *Data Evaluation Report, Coumaphos, Study Type, Acute Oral, Dermal Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 112832-7, 26370-9, 82524*, CHEG-000203 (1998).

Chang, S. S., *Data Evaluation Report, Niclosamide, Study Type, Rodent Dominant Lethal Assay, MRID No. 42552312, 42552302, 42552305, 42552306-9*, CHEG-000204 (1998).

Chang, S. S., *Data Evaluation Report, Dimethomorph, Study Type, Dermal Sensitization, MRID No. 44175305*, CHEG-000207 (1998).

Chang, S. S., *Data Evaluation Report, Trifluralin, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization, MRID No. 40103101-6, 40405001-6, 41233605-9, 41993805-9, 130853, 137468*, CHEG-000208 (1998).

Chang, S. S., *Data Evaluation Report, Trifuralin, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation, Dermal Sensitization, MRID No. 43462304-9, 40822201-2 and 138224*, CHEG-000209 (1998).

Chang, S. S., *Data Evaluation Report, Terraclor, Study Type, Acute Oral, Dermal, Inhalation Toxicity and Primary Dermal Irritation, MRID No. 43742601-4*, CHEG-000211 (1998).

Chang, S. S., *Data Evaluation Report, TRA 0201 Lot PD-0508-P027, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization. MRID No. 44433002-7*, CHEG-000212 (1998).

Chang, S. S., *Data Evaluation Report, BAS 589 03 H, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye And Dermal Irritation, MRID No. 44322205, 44342901-4*, CHEG-000213 (1998).

Chang, S. S., *Data Evaluation Report, CGA-77102 11 16GR, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 44395403-9*, CHEG-000214 (1998).

Chang, S. S., *Data Evaluation Report for Marks MCPA 2EH, Acute Dermal, Oral, Inhalation Toxicity, and Primary Dermal Irritation, MRID No. 44627506-09; 44627606-10*, CHEG-000215 (1998).

Chang, S. S., *Data Evaluation Report for NAF-313, Acute Dermal, Oral, Inhalation Toxicity, Primary Dermal and Eye Irritation and Dermal Sensitization, MRID No. 44597726-30*, CHEG-000217 (1998).

Chang, S. S., *Data Evaluation Report for Potassium Cresylate, MRID No. 144114, Study Type, Primary Eye and Dermal Irritation, and Dermal and Oral Toxicity*, CHEG-000231 (1998).

Chang, S. S., *Data Evaluation Report for 2-Benzyl-4-chlorophenol, 131367, 44464501, and 130938, Study Type, Acute Inhalation, Dermal, and Oral Toxicity*, CHEG-000232 (1998).

Chang, S. S., *Data Evaluation Report, Potassium 2-Benzyl-4-Chlorophenate (Lwgphene Germicidal Cleaner, Study Type, Primary Dermal Irritation - Rabbit, MRID No. 130086, 134250, 134578*, CHEG-000235 (1998).

Chang, S. S., *Data Evaluation Report, Potassium-2-Benzyl-4-Chlorophenate, Study Type, Primary Eye Irritation - Rabbit, MRID No. 130939*, CHEG-000236 (1998).

Chang, S. S., *Data Evaluation Report, Potassium-2-Benzyl-4-Chlorophenate, Study Type, Primary Eye Irritation - Rabbit*, CHEG-000237 (1998).

Chang, S. S., *Data Evaluation Report, Potassium,-2-Benzyl-4-Xhlorophenate, Study Type, Acute Oral Toxicity Rat. MRID No. 133697*, CHEG-000238 (1998).

Chang, S. S., *Data Evaluation Report, O-Phenylphenol, Study Type, Primary Eye Irritation - Rabbit, MRID No. 41634101*, CHEG-000239 (1998).

Chang, S. S., *Data Evaluation Report, O-Phenylphenol, Study Type, Primary Dermal Irritation, MRID No. 41634102*, CHEG-000240 (1998).

Chang, S. S., *Data Evaluation Report, Potassium - 2-Benzyl-4-Chlorophenate, Study Type, Primary Eye Irritation, MRID No. 133697*, CHEG-000241 (1998).

Chang, S. S., *Data Evaluation Report, Potassium-2-Benzyl-4-Chlorophrnate, Study Type, Primary Dermal Irritation, MRID No. 131369*, CHEG-000242 (1998).

Chang, S. S., *Data Evaluation Report, Potassium 2-Benzyl-4-Chlorophenate, Study Type, Primary Dermal Irritation, MRID No. 130086, 134250 and 134578*, CHEG-000243 (1998).

Chang, S. S., *Data Evaluation Report, Potassium 2-Benzyl-4-Chlorophenate, Study Type, Primary Eye Irritation, MRID No. 130086, 134250 and 134578*, CHEG-000244 (1998).

Chang, S. S., *Data Evaluation Report, Sodium O-Phenylphenate, Study Type, Primary Eye Irritation, MRID No. 138574*, CHEG-000245 (1998).

Chang, S. S., *Data Evaluation Report, Sodium O-Phenylphenate, Study Type, Primary Dermal Irritation, MRID No. 138576*, CHEG-000246 (1998).

Chang, S. S., *Data Evaluation Report, Sodium O-Phenylphenate, Study Type, Acute Dermal Toxicity, MRID No. 138577*, CHEG-000247 (1998).

Chang, S. S., *Data Evaluation Report, Sodium O-Phenylphenate, Study Type, Acute Oral Toxicity, MRID No. 138578*, CHEG-000248 (1998).

Chang, S. S., *Data Evaluation Report, Axiom tm/Atrazine, Study Type, Acute Oral, Dermal, Inhalatuion Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 44609701-06*, CHEG-000249 (1998).

Chang, S. S., *Data Evaluation Report, Propazine, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 43474101-6*, CHEG-000255 (1998).

Chang, S. S., *Data Evaluation Report, Triallate, Study Type, Dermal Sensitization - Guinea Pig, MRID No. 44308301*, CHEG-000259 (1998).

Chang, S. S., *Data Evaluation Report, Bifenazate, Study Type, Primary Eye Irritation, MRID No. 44462312, 44462309, 44462308, 44462310, 44462311, 44462313, 44462314*, CHEG-000263 (1998).

Chang, S. S., Data Evaluation Report, Bifenazate, Study Type, Acute Inhalation toxicity, MRID No. 44464937, 44464938, 44464939, 44464940, 44464934, 44464935, 44464936, CHEG-000264, December 1998.

Chang, S. S., Data Evaluation Report, Ethyl Alcohol, Study Type, Acute Oral Toxicity, MRID No. 44471101, 44139603, 44139607, 44139606, 44139605., CHEG-000265, November 1998.

Chang, S. S..., Data Evaluation Report, 3-Iodo-2-Propynyl Butylcarbamate, Study Type, Dermal Senditization, MRID No. 44519402-07, CHEG-000295, November 1998.

Chang, S. S..., Data Evaluation Report, 3-Iodo-2-Propynyl Butylcarbamate, Study Type, Primary eye, dermal Irritation, MRID No. 44476208, 44476209,44476205, 44476206, 44476210., CHEG-000296, October 1998.

Chang, S. S., *Data Evaluation Report, 3-Iodo-2-Propynyl Butylcarbamate, Study Type, Primary Eye Irritation, Acute Oral and Dermal Toxicity, MRID No. 44510205, 44486004, 44486006, 44486007, 44486008, 44486009*, CHEG-000297 (1998).

Chang, S. S., *Data Evaluation Report, 3-Iodo-2-Propynyl Butylcarbamate, Study Type, Acute Inhalation Toxicity, MRID No. 44476207*, CHEG-000298 (1998).

Chang, S. S., *Data Evaluation Report, 3-Iodo-2-Propynyl Butylcarbamate, Study Type, Dermal Sensitization, Acute Oral, Inhalation, Primary Eye, Dermal Toxicity.MRID No. 44476207, 44507503-7*, CHEG-000299 (1998).

Chang, S. S., *Data Evaluation Report, Bis (Tributyltin) Oxide, Study Type, Acute Oral Toxicity, MRID No. 44468101*, CHEG-000300 (1998).

Chang, S. S., *Data Evaluation Report, DPX-MP062-89, Study Type, Acute Oral Toxicity, MRID No. 44477114*, CHEG-000308 (1998).

Chang, S. S., *Data Evaluation Report, DPX-JW062-112, Study Type, Acute Inhalation Toxicity, MRID No. 44477121, 44477119*, CHEG-000309 (1998).

Chang, S. S., *Data Evaluation Report, DPX-MP062-89A&B, Acute Inhalation Toxicity and Primary Eye Irritation, MRID No. 44477120, 44477123*, CHEG-000310 (1998).

Chang, S. S., *Data Evaluation Report, DPX-MP062 Technical, Study Type, Acute Dermal Toxicity, MRID No. 44477118, 44477125, 44477126, 44477122, 44477113*, CHEG-000312 (1998).

Chang, S. S., D*ata Evaluation Report, DPX-MP062 150SC, Study Type, Dermal Sensitization, Primary Eye and Dermal Irritation, Acute Inhalation,MRID No. 44482008, 44482006, 44482007, 44482005, 44482003, 44482004*, CHEG-000316 (1998).

Chang, S. S., *Data Evaluation Report, DPX-KN128 Technical, Study Type, Acute Oral Toxicity, MRID No. 44477115*, CHEG-000317 (1998).

Chang, S. S., *Data Evaluation Report, Ethyl Alcohol, Study Type, Acute Oral Toxicity, MRID No. 41417210, 44139501, 44530201*, CHEG-000322 (1998).

Chang, S. S., and H. T. Borges, *Data Evaluation Report, Isopropanol, Study Type, Primary Dermal Irritation, MRID No. 44473901, 44473902, 44111101, 44111103 -06, 44111102, 44650702-7*, CHEG-000323 (1998).

Chang, S. S., *Data Evaluation Report, IN-JU874, Study Type, Primary eye Irritation, MRID No.* 44477124, CHEG-000325 (1998).

Chang, S. S., *Data Evaluation Report, IN-JT333-20, Study Type, Acute Oral Toxicity, MRID No. 44477117*, CHEG-000326 (1998).

Chang, S. S., *Data Evaluation Report, Didecyl Diemethyl Ammonium Carbonate, Study Type, Dermal Sensitization, MRID No. 44511305, 44511304, 44511303. 44511301, 44511302*, CHEG-000330 (1998).

Chang, S. S., *Data Evaluation Report, Bis(Tributyltin) Oxide, Study Type, Primary Eye Irritation, MRID No. 44593501*, CHEG-000347 (1998).

Chang, S. S., *Data Evaluation Report, Dimethoate, Study Type, Primary Eye irritation, MRID No. 164222, 164219, 164220*, CHEG-000363 (1998).

Chang, S. S., *Data Evaluation Report, Copper ammonium Carbonate, Study Type, Acute Oral Toxicity, MRID No. 44651301*, CHEG-000364 (1998).

Chang, S. S., *Data Evaluation Report, Dimethoate, Study Type, Primary Dermal Irritation, MRID No. 164221*, CHEG-000367 (1998).

Chang, S. S., *Data Evaluation Report, Copper ammonium Carbonate, Study Type, Acute Oral toxicity, MRID No. 44651401*, CHEG-000373 (1998).

Chen, C. H., *Report of Foreign Travel by C.H. Chen, June 14-22, 1997,* ORNL/FTR-6219 (1997).

Cline, S. R., O. R. West, N. E. Korte, F. G. Gardner, R. L. Siegrist, and J. L. Baker, *$KmnO_4$ Chemical Oxidation and Deep Soil Mixing for Soil Treatment,* M97-95086.

Coleman, R. L. and G. H. Forbes, *Confirmatory Radiological Survey for the 190-C Main Pumphouse Facility Decommissioning at the Hanford Site, Richland, Washington,* ORNL/TM-13434 (1997).

Courville, G. E., T. O. Early, C. E. Easterly, and G. A. Tuskan, *Report of Foreign Travel by G. E. Courville, T. O. Early, C. E. Easterly and G. A. Tuskan, February 20-28,1998,* ORNL/FTR-6510 (1998).

Daugherty, M. L., *Chemical Summary for 1H-Pyrrole*, ORNL/M-5573 (1997).

Daugherty, M. L., *Chemical Summary for Phenol*, ORNL/M-5574 (1997).

Daugherty, M. L., *Chemical Summary for Potassium Hydroxide*, ORNL/M-5575 (1997).

Daugherty, M. L., *Chemical Summary for Hydrochloric Acid*, ORNL/M-5576 (1997).

Daugherty, M. L., *Chemical Summary for Palladium and Palladium Chloride*, ORNL/M-5577 (1997).

Daugherty, M. L., *Chemical Summary for Carbon Black*, ORNL/M-5578 (1997).

Daugherty, M. L., *Chemical Summary for Diethylene Glycol Monoethyl Ether Acetate*, ORNL/M-5579 (1997)

Daugherty, M. L., *Chemical Summary for Benzotriazole*, ORNL/M-5580 (1997).

Daugherty, M. L., *Chemical Summary for Tetrasodium EDTA (Na_4EDTA)*, ORNL/M-5581 (1997).

Daugherty, M. L., *Chemical Summary for Tetraglycine*, ORNL/M-5582 (1997).

Daugherty, M. L., *Chemical Summary for Sodium Sulfate*, ORNL/M-5641 (1997).

Daugherty, M. L., *Chemical Summary for Hydroxylamine Sulfate*, ORNL/M-5642 (1997).

Daugherty, M. L., *Chemical Summary for Ethylenediamine Tetraacetic Acid (EDTA)*, ORNL/M-5643 (1997).

Daugherty, M. L., *Chemical Summary for Dimethylamineborane (DMAB)*, ORNL/M-5644 (1997).

Daugherty, M. L. and R. A. Young, *Data Evaluation Report for Chlorpyrifos-Methyl MRID No. 00030757 and 00029484,* ORNL/M-6402 (1998).

Daugherty, M. L., C. S. Forsyth, and S. Milanez, *Data Evaluation Report for Terrazole, MRID No. No. 00120415, 00001698, 00012045, 00104999, 00001698, 00093744, 00120415*, CHEG-000218 (1998).

Davidson, K. A., *Data Evaluation Report, Tybufenpyrad, Study Type, Combined Chronic/Oncogenicity Feeding, MRID No. 43309320*, ORNL/M-5138 (1997).

Davidson, K. A., *Review of a Study Entitled "Respiratory Effects from the Inhalation of Hydrogen Chloride in Young Adult Asthmatics", Stevens, Bas et al. (1992)*, ORNL/M-5710 (1997).

Davidson, K. A., *Data Evaluation Report, Dimethipin, Study Type, Chronic/Oncogenicity Feeding-Rat, MRID No. 43897601*, ORNL/M-5722 (1997).

Davidson, K. A., *Data Evaluation Report, Sulfuryl Fluoride, Study Type: Combined Chronic/Oncogenicity Inhalation - Rat (83-5) - MRID 43354902,* ORNL/M-5741 (1997).

Davidson, K. A., *Data Evaluation Report, DPX-R6447-50, Study Type: combined Chronic/Oncogenicity Feeding - Rat (83-5) 12-Month Interim Report - MRID 44085603,* ORNL/M-5800 (1997).

Davidson, K. A., *Data Evaluation Report, Pyrazon, Study Type, Oncogenicity Feeding, MRID No. 42903405*, ORNL/M-6192 (1997).

Davidson, K. A., *Data Evaluation Report for Dicofol MRID No. 44253801,* ORNL/M-6196 (1997).

Davidson, K. A., *Data Evaluation Report for FOLPET MRID No. 44316501,* ORNL/M-6200 (1997).

Davidson, K. A., *Proposed Acute Exposure Guideline Levels (AGELs) for Ethylene Oxide,* ORNL/M-6244 (1998).

Davidson, K. A., *Data Evaluation Report, Folpet, Study Type, Special Study-Mouse, MRID No. 44286303*, ORNL/M-6277 (1998).

Davidson, K. A., *Data Evaluation Report, DPX-R6447-50, Study Type, Combined Chronic/Oncogenicity Feeding-Rat, MRID No. 44366104,* CHEG-000060 (1998).

Davidson, K. A., *Data Evaluation Report, Nitrapyrin, Study Type, Oncogenicity Feeding, MRID No. 44231803*, CHEG-000129 (1998).

Davidson, K. A., *Data Evaluation Report, Nitrapyrin, Study Type, Subchronic Oral Toxicity Feeding, MRID No. 44231802*, CHEG-000150 (1998).

Davidson, K. A., *Data Evaluation Report, Dicofol, Study Type, Special One-generation Feeding, MRID No. 44253801*, CHEG-000156 (1997).

Davidson, K. A., *Data Evaluation Report, Folpet, Study Type, Oncogenicity Feeding, MRID No. 44316501*, CHEG-000159 (1997).

Davidson, K. A., *Data Evaluation Report, Tetramethrin, Study Type, Oncogenicity Feeding, MRID No. 44096001*, CHEG-000161 (1997).

Davidson, K. A., *Data Evaluation Report, RH-2915 (Oxyfluorofen), Study Type, Chronic Toxicity/Oncogenicity, MRID No. 83445,96872,92136061*, CHEG-000252 (1998).

Eckerman, K. F., *Report of Foreign Travel by K. F. Eckerman, February 1-8, 1997*, ORNL/FTR-6090 (1997).

Eckerman, K. F., *Report of Foreign Travel by K. F. Eckerman, September 7-18, 1997*, ORNL/FTR-6326 (1997).

Eckerman, K. F., *Report of Foreign Travel by K. F. Eckerman, September 14-19, 1998*, ORNL/FTR-6712 (1998).

Faust, R. A., *Data Evaluation Report, FOE 5043, Study Type, Acute Oral Neurotoxicity-Rat, MRID No. 43735301*, ORNL/M-5137 (1997).

Faust, R. A., *Health Risk Assessment for Cyanogen Chloride (CK)*, ORNL/M-5296 (1997).

Faust, R. A., *Chemical Summary for Ethanolamine*, ORNL/M-5604 (1997).

Faust, R. A., *Chemical Summary for Potassium Bisulfate*, ORNL/M-5605 (1997).

Faust, R. A., *Chemical Summary for Sodium Carbonate*, ORNL/M-5606 (1997).

Faust, R. A., *Chemical Summary for Sodium Hydroxide*, ORNL/M-5607 (1997).

Faust, R. A., *Chemical Summary for N,N,N',N'-Tetrakis(2-Hydroxypropyl) Ethylenediamine*, ORNL/M-5608 (1997).

Faust, R. A., *Chemical Summary for Potassium Persulfate*, ORNL/M-5609 (1997).

Faust, R. A., *Chemical Summary for Sulfuric Acid*, ORNL/M-5610 (1997).

Faust, R. A., *Chemical Summary for N,N-Dimethylformamide*, ORNL/M-5611 (1997).

Faust, R. A., *Chemical Summary for 2-Butoxyethanol Acetate*, ORNL/M-5612 (1997).

Faust, R. A., *Chemical Summary for Water (Deionized and Reverse Osmosis)*, ORNL/M-5613 (1997).

Faust, R. A., *Chemical Summary for Ammonium Chloride*, ORNL/M-5614 (1997).

Faust, R. A., *Chemical Summary for N-Methylpyrrolidinone*, ORNL/M-5615 (1997).

Faust, R. A., *Chemical Summary for Sodium Citrate*, ORNL/M-5616 (1997).

Faust, R. A., *Chemical Summary for Sodium Calorite*, ORNL/M-5617 (1997).

Faust, R. A., *Chemical Summary for Formic Acid*, ORNL/M-5618 (1997).

Faust, R. A., *Chemical Summary for Hydroxyacetic Acid*, ORNL/M-5619 (1997).

Faust, R. A., *Chemical Summary for Potassium and Sodium Cyanide*, ORNL/M-5620, January 1997.

Faust, R. A., *Chemical Summary for Citric Acid*, ORNL/M-5621 (1997).

Faust, R. A., *Pharmacokinetics*, ORNL/M-5622 (1997).

Faust, R. A., *Chemical Summary for Graphite*, ORNL/M-5645 (1997).

Faust, R. A., *Chemical Summary for Peroxymonosulfuric Acid, Monopotassium Salt*, ORNL/M-5646 (1997).

Faust, R. A., *Data Evaluation Report, Emamectin, Study Type, Subchronic Oral Toxicity Gavage-Dog*, ORNL/M-5647 (1997).

Faust, R. A., *Data Evaluation Report, DuPont R6447, Study Type: Acute Oral Neurotoxicity - Rat (81-8) - MRID 44075849,* ORNL/M-5799 (1997).

Faust, R. A., *Data Evaluation Report, Busan 1157, Study Type, Multigeneration Reproduction-Rat, MRID No. 44369201,* CHEG-000065 (1998).

Faust, R. A., *Data Evaluation Report, Oxyflourofen, Study Type, Chronic Oral Toxicity, MRID No. 78767,* CHEG-000251 (1998).

Ferrell, T. L., *Telesensors,* ORNL/M-6149 (1997).

Ferrell, T. L., W. W. Manges, and G. W. Morrison, *Wireless Medical Telesensor Development at Oak Ridge National Laboratory,* ORNL/M-6204 (1997).

Forbes, G. H. and P. V. Egidi, *Confirmatory Radiological Survey of the Grand Junction Projects Office Remedial Action Project Exterior Portions, 1989-1995,* ORNL/TM-13356 (1997).

Forsyth, C. S., *Data Evaluation Report, Ziram, Study Type, Developmental Neurotoxicity-Rat, MRID No. 43935801,* ORNL/M-5571 (1997).

Forsyth, C. S., *Data Evaluation Report, Bensulide Developmental Toxicity Study - Rabbit (83-3b) - MRID No. 00152845,* ORNL/M-5572 (1997).

Forsyth, C. S., *Chemical Summary for Diethylene Glycol Methyl Ether,* ORNL/M-5628 (1997).

Forsyth, C. S., *Chemical Summary for Ethylene Glycol,* ORNL/M-5629 (1997).

Forsyth, C. S., *Chemical Summary for Triethanolamine,* ORNL/M-5630 (1997).

Forsyth, C. S., *Chemical Summary for 2-Ethoxyethanol,* ORNL/M-5631 (1997).

Forsyth, C. S., *Chemical Summary for Sodium Hypophosphite 1-Hydrate,* ORNL/M-5632 (1997).

Forsyth, C. S., *Chemical Summary for Methanol,* ORNL/M-5633 (1997).

Forsyth, C. S., *Chemical Summary for Lithium Hydroxide,* ORNL/M-5634 (1997).

Forsyth, C. S., *Chemical Summary for Ammonia,* ORNL/M-5635 (1997).

Forsyth, C. S., *Chemical Summary for Diethylene Glycol N-Butyl Ether,* ORNL/M-5636 (1997).

Forsyth, C. S., *Chemical Summary for Sodium Permanganate,* ORNL/M-5637 (1997).

Forsyth, C. S., *Chemical Summary for Sodium Hypophosphite,* ORNL/M-5638 (1997).

Forsyth, C. S., *Data Evaluation Report, Bensulide, Study Type, Multigeneration Reproductin-Rat, MRID No. 43948701,* ORNL/M-5706 (1997).

Forsyth, C. S., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Developmental Toxicity-Rat, MRID No. 43864251,* ORNL/M-5723 (1997).

Forsyth, C. S., *Data Evaluation Report, Kresoxim-Methyl, Study Type: Multigeneration Reproduction - Rat (83-4) - MRID 43864253,* ORNL/M-5747 (1997).

Forsyth, C. S., *Data Evaluation Report, DuPont R6447, Study Type, Development Toxicity-Rat, MRID No. 44075853,* ORNL/M-5771 (1997).

Forsyth, C. S., *Data Evaluation Report, DuPont R6447, Study Type: Subchronic Oral Toxicity Feeding - Rat (82-1a) - MRID 44075850,* ORNL/M-5788 (1997).

Forsyth, C. S., *Data Evaluation Report for Oxine Copper; Study Type: Acute Inhalation Toxicity; Subchronic Oral Toxicity Feeding - Mouse; MRID 43572401/43611901,* ORNL/M-6186 (1997).

Forsyth, C. S., S. Milanez, and C. B. Bast, *Data Evaluation Report for Dichlorvos, MRID 402974401, 40299601, 41593101, 42655301, and 41951501,* ORNL/M-6194.

Forsyth, C. A., *Proposed Acute Exposure Guideline Levels (AGELs) for Nitric Acid,* ORNL/M-6246 (1998).

Forsyth, C. S., *Data Evaluation Report for Dodine MRID 44246101* , ORNL/M-6248 (1998).

Forsyth, C. S., *Data Evaluation Report for TFM (3-Trifluoromethyl-4-Nitrophenol) MRID 00131201* , ORNL/M-6249 (1998).

Forsyth, C. S., *Data Evaluation Report for Niclosamide MRID 42552310,* ORNL/M-6250 (1998).

Forsyth, C. S., *Data Evaluation Report, Dichlobenil, Study Type, Chronic Oral Toxicity, MRID No. 43969701,* ORNL/M-6273 (1998).

Forsyth, C. S., *Data Evaluation Report for Dichlobenil MRID 43969701,* ORNL/M-6500 (1998).

Forsyth, C. S., *Data Evaluation Report, Pebulate (Technical), Study Type, Developmental-Rabbit, Health Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Arlington, VA 22202, MRID No. 40033201*, CHEG-000049 (1998).

Forsyth, C. S., *Data Evaluation Report, Pebulate (Tillam Technical), Study Type, Developmental Toxicity-Rat, MRID No. 40033301*, CHEG-000056 (1998).

Forsyth, C. S., *Data Evaluation Report, Fortune AZA Technical, Study Type, Honeybee Acute Toxicity Test (Non-Guidline)and Test for Aquatic Invertabrates. MRID No. 44428504, 44428501*, CHEG-000097 (1998).

Forsyth, C. S., *Data Evaluation Report, Fortune AZA Technical, Study Type, Avian dietary Toxicity Test, and Fish Acute Toxicity Test, Freshwater, MRID No. 44428503, 44428502*, CHEG-000099 (1998).

Forsyth, C. S., *Data Evaluation Report, SKW20010, Study Type, Multigeneration Reproduction, MRID No. 44394616*, CHEG-000103 (1998).

Forsyth, C. S., *Data Evaluation Report, Xentari WDG, Study Type, Honey Bee toxicity/Pathogenicity Test Tier I, MRID No. 44376101*, CHEG-000116 (1998).

Forsyth, C. S., Milanez, Sylvia, *Data Evaluation Report, Dictrotophos, Study Type, Multigeneration Reproduction, MRID No. 44296101 and 44328401*, CHEG-000146 (1998).

Forsyth, C. S., *Data Evaluation Report, 3-Trifluoromethyl-4-Nitrophenol, Study Type, Developmental Toxicity*, CHEG-000152 (1998).

Forsyth, C. S., *Data Evaluation Report, Dodine, Study Type, Chronic Oral Toxicity (Capsule) MRID No. 44246101*, CHEG-000153 (1998).

Forsyth, C. S., *Data Evaluation Report, Granola 97, Study Type, Developmental Toxicity, MRID No. 44438711 and 44438710*, CHEG-000163 (1998).

Forsyth, C. S., *Data Evaluation Report, Pendimethalin, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 44294504-9*, CHEG-000190 (1998).

Forsyth, C. S., *Data Evaluation Report, Chlorpyrifos, Study Type,s Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization. MRID No. 44324201-6*, CHEG-000192 (1998).

Forsyth, C. S., *Data Evaluation report, Oxyflourofen, Study Type, Multigeneration Reproduction, MRID No. 42014901*, CHEG-000269 (1998).

Forsyth, C. S., Robert A. Young, Faust, Rosmarie A., Long, Tessa, *Data Evaluation Report, DPX-JW062, Study Type, Developmental Toxicity, Metabolism, Acute Oral Neurotoxicity Screening, Subchronic Oral Toxicity Feeding, MRID No. 44477139, 44477153, 44477128, 44477127, 44477130, 44477141*, CHEG-000304 (1998).

Forsyth, C. S., *Data EValuation Report, 3-IODO-2-propynyl butylcarbamate, Study Type, Multigeneration Reproduction, MRID No. 44478801*, CHEG-000320 (1998).

Forsyth, C. S., *Data Evaluation Report, MON 13900, Study Type, Multigeneration Reproduction, MRID No. 44533201*, CHEG-000366 (1998).

Forsyth, P. G., *Chemical Summary for Phenol-Formaldehyde Copolymer*, ORNL/M-5598 (1997).

Forsyth, P. G., *Chemical Summary for Vanillin*, ORNL/M-5599 (1997).

Forsyth, P. G., *Data Evaluatio Report for CRY9C Protein, Study Type, Honey Bee Testing, TIER I and Non Guideline MRID No. Nos., 44384302-03, 44161701, and 44384301*, ORNL/M-6417 (1998).

Forsyth, P. G., *Data Evaluation Report, ABG-6305, Study Type, Avian Oral Pathogenicity/Toxicity Test - Mallard Duck (154-16) - MRID No. 41974805*, ORNL/M-5567 (1997).

Forsyth, P. G., *Data Evaluation Report, ABG-6305, Study Type, Avian Oral Pathogenicity/Toxicity Test - Bobwhite Quail (154-16) - MRID No. 41974804*, ORNL/M-5639 (1997).

Forsyth, P. G., *Data Evaluation Report, Aminoethoxyvinylglycine Hydrochloride, Study Type, Residue and Metabolite Analyses - Apple Leaves and Fruit, MRID No. 43846501*, ORNL/M-5553 (1997).

Forsyth, P. G., *Data Evaluation Report, Condor Insecticide, Study Type, Avian Single-Dose Acute Oral Toxicity and Pathogenicity Test - Bobwhite Quail (154-16), MRID No. 40898807*, ORNL/M-5569 (1997).

Forsyth, P. G., *Data Evaluation Report, Potassium Salts of Phosphorous Acid, A Dietary LC50 Study with the Northern Bob White, MRID No. 43905813*, ORNL/M-5640 (1997).

Forsyth, P. G., *Data Evaluation Report, Potassium Salts of Phosphorous Acid, Study Type, Freshwater Aquatic Invertebrate Acute Bioassay-Daphnia Magna, MRID No. 43905816*, ORNL/M-5568 (1997).

Forsyth, P. G., *Data Evaluation Report, Potassium Salts of Phosphorous Acid, An Acute Oral Toxicity Test with the Bob White Quail, MRID No. 43905812*, ORNL/M-5566 (1997).

Forsyth, P. G., *Data Evaluation Report, Potassium Salts of Phosphorous Acid, Acute Toxicity to Rainbow Trout Under Static Conditions, MRID No. 43905814*, ORNL/M-5570 (1997).

Forsyth, P. G., *Data Evaluation Report, Potassium Salts of Phosphorous Acid, An acute Contact Toxicity Study with the Honey Bee, MRID No. 43905817*, ORNL/M-5565 (1997).

Fowler, D. E., J. N. Herndon, J. P. Hill, W. H. Miller, J. G. Mullins, W. W. Pope, A. W. Saulsbury, C. A. Schrof, F. J. Smith, L. L. Triplett, and H. R. Yook, *ORNL Necessary and Sufficient Standards for Environmental, Safety, and Health - Final Report for the Identification Team for Other Industrial, Radiological, and Non-Radiological Hazard Facilities*, ORNL/TM-13638 (1998).

Francis, A. A., *Chemical Summary for Silver*, ORNL/M-5623 (1997).

Francis, A. A., *Chemical Summary for p-Toluene Sulfonic Acid*, ORNL/M-5624 (1997).

Francis, A. A., *Chemical Summary for Formaldehyde*, ORNL/M-5625 (1997).

Francis, A. A., *Chemical Summary for Sodium Bisulfate*, ORNL/M-5626 (1997).

Francis, A. A., *Chemical Summary for Copper and Selected Copper Compounds*, ORNL/M-5627 (1997).

Francis, A. A., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Subchronic Oral Toxicity Feeding-Mouse*, ORNL/M-5648 (1997).

Francis, A. A., *Data Evaluation Report, Sulfuryl Fluoride, Study Type, Oncogenicity Inhalation-Mouse, MRID No. 43354903*, ORNL/M-5709 (1997).

Francis, A. A., *Data Evaluation Report, Dimethylhydantoin, Study Type, Combined Chronic/Oncogenicity Feeding-Rat, MRID No. 44095901*, ORNL/M-5738 (1997).

Francis, A. A., *Data Evaluation Report, Emamectin, Study Type, Oncogenicity Feeding, Mouse, MRID No. 43868105*, ORNL/M-5746 (1997).

Francis, A. A., *Data Evaluation Report, Malaoxon, Study Type, Combined Chronic/Oncogenicity Feeding, MRID No. 43975201*, ORNL/M-6275 (1997).

Francis, A. A., *Data Evaluation Report for Malaoxon, MRID 43975201* , ORNL/M-6497.

Francis, A. A., *Data Evaluation Report, Dicrotophos, Study Type, Oncogenicity Feeding - Mouse (83-2B), MRID No. 44527801*, CHEG-000016 (1998).

Francis, A.A., Data Evaluation Report, DPX-R6447-50, Study Tupe Oncogenicity Feeding-Mouse, MRID No. 44306205, CHEG-000059, July 1998.

Francis, A. A., *Data Evaluation Report, Dithianon, Study tyupe Oncogenicity Feeding-Mouse, MRID No. 44092609,44092612 44192614*, CHEG-000080 (1998).

Francis, A. A., *Data Evaluation Report, Malaoxon, Study Type, Combined Chronic/oncogenicity Feeding, MRID No. 43975201*, CHEG-000177 (1997).

Francis, A. A., *Data Evaluation Report, Mon 4660, Study Type, Oncogencity Feeding, MRID No. 44272601, 44272501*, CHEG-000280 (1998).

Francis, A. A., *Data Evaluation Report, DPX-JW062-106, Study Type, Oncogenicity Feeding, MRID No. 44477137*, CHEG-000314 (1998).

Griest, W. H., A. A. Vass, and A. J. Stewart, *Chemical & Toxicological Characterization of Slurry Reactor Biotreatment of Explosives-Contaminated Soils,* ORNL/TM-13384 (1998).

Haas, R. T., L. M. Floyd, and M. W. Francis, *Security Training Records System - User's Manual,* ORNL/M-5668 (1997).

Haas, R. T., L. M. Floyd, and M. W. Francis, *Security Training Records System - Technical Manual,* ORNL/M-5735 (1997).

Halpern, M. P. and C. Forsyth, *Data Evaluation Report for Pebulate MRID 41556803 and 41614809,* ORNL/M-6400 (1998).

Halpern, M. D., *Data Evaluation Report, Aminoethoxyvinylglycinehydrochloride, Study Type, Immunotoxicity Feeding - Rat (152-18), MRID No. 43846507*, ORNL/M-5554 (1997).

Halpern, M. D., *Data Evaluation Report, Bifenazate, Study Type, Subchronic Oral Toxicity Feeding, MRID No. 44472702, 44464941*, CHEG-000267 (1998).

Hitch, J. P. and P. S. Hovatter, *Assessment of Location-Specific Applicable or Relevant and Appropriate Requirements (ARARS) for the Southeast Industrial Area (SIA) at Anniston Army Depot (ANAD), Alabama,* ORNL/M-5714 (1997).

Holton, G. A., I. Miller, *Chemical Summary for Potassium Permanganate*, ORNL/M-5586 (1997).

Hovatter, P. S. and M. A. Kilby, *Assessment of Chemical-specific ARARs for the Remediation of Off-Post Groundwater at Operable Unit 6, Letterkenny Army Depot, Pennsylvania*, ORNL/M-6281 (1997).

Hovatter, P. S., M. A. Kilby, S. E. Arnold, and J. Pearson, *Assessment of ARARs for the Remediation of the Groundwater Operable Unit, Southeast Industrial Area, Anniston Army Depot, Alabama,* ORNL/M-6282 (1998).

Hovatter, P. S., M. A. Kilby, and E. B. Lewis, *Assessment of Chemical-and Location-Specific ARARS Remedial Activities at Operable Unit 7, Letterkenny Army Depot, Pennsylvania*, ORNL/M-6283 (1997).

Hovatter, P. S., M. A. Kilby, S. E. Arnold, and J. P. Hitch, *Assessment of ARARs and TBC Guidance for the Golf Course Sites at Fort Dix, New Jersey*, ORNL/M-6286 (1998).

Hovatter, P. S. and M. A. Kilby, *Assessment of Chemical-and Location-Specific ARARs and TBC Guidance for Remedial Activities at Operable Unit 5, Southeast Area Letterkenny Army Depot, Pennsylvania*, ORNL/M-6287 (1997).

Hovatter, P. S., M. A. Kilby, and E. B. Lewis, *Assessment of Chemical- and Location-Specific ARARs Remedial Activities at Operable Unite 7, Letterkenny Army Depot, Pennsylvania,* ORNL/M-6391 (1998).

Hovatter, P. S. and M. A. Kilby, *Assessment of Chemical-Specific ARARs and TBC Guidance for the Remediation of Off-Post Groundwater Operable Unit 6 (OU-6) at Letterkenny Army Depot, Pennsylvania,* ORNL/M-6392 (1998).

Hovatter, P. S. and M. A. Kilby, *Assessment of Chemical- and Location-Specific ARARs for the Remediation of Off-Post Groundwater Operable Unit 6 (OU-6) at Letterkenny Army Depot, Pennsylvania,* ORNL/M-6393 (1998).

Hovatter, P. S., M. A. Kilby, S. E. Arnold, and J. Pearson, *Assessment of ARARs and TBC Guidance for the MAG-1 Area at Fort Dix, New Jersey,* ORNL/M-6668 (1998).

Hovatter, P. S. and M. A. Kilby, *Assessment of Chemical- and Location-Specific ARARs and TBC Guidance for Remedial Activities at Operable Unit 5, Southeast Area Letterkey Army Depot, Pennsylvania,* ORNL/M-6669 (1998).

Hovatter, P. S., M. A. Kilby, and J. Pearson, *U.S.A.E.C., U.S. Army Environmental Center, Assessment of Chemical-specific Applicable or Relevant and Appropriate Requirements (ARARS) for Pdo Landfill and 4400 Area in Cantainment Area at Fort Dix, New Jersey, Regulatory Draft,* CHEG-000127 (1997).

Jacobson, K. B., *Report of Foreign Travel by K.B. Jacobson, May 23-June 14, 1997,* ORNL/FTR-6223 (1997).

Kilby, M. A., J. P. Hitch, and P. S. Hovatter, *Assessment of Chemical-Specific Applicable or Relevant and Appropriate Requirements (ARARS) for Remediation of the Groundwater Operable Unit in the Southeast Industrial Area at Anniston Army Depot (ANAD), Alabama,* ORNL/M-5717 (1997).

Kilby, M. A., J. P. Hitch, and P. S. Hovatter, *Assessment of Chemical-Specific Applicable or Relevant and Appropriate Requirements (ARARS) for PDO Landfill and 4400 Area in Cantonment Area at Fort Dix, New Jersey,* ORNL/M-6414 (1998).

King, J, S. S. Talmage, A. P. Watson, *The Sources, Fate, and Toxicity of Chemical Warfare Agent Degradation Products* (1998).

Knapp, F. F., Jr., *Report of Foreign Travel by F. F. Knapp, Jr., August 18 - September 5, 1997,* ORNL/FTR-6302 (1997).

Knapp, F. F., Jr., *Report of Foreign Travel by F. F. Knapp, Jr., April 2-20, 1997,* ORNL/FTR-6137 (1997).

Knapp, F. F., Jr., S. Guhlke, A. L. Beets, and S. Mirzadeh, *Tandem-Column Concentration to Provide Rhenium-188 Radioisotope for Coronary Restenosis Therapy,* M98-96241.

Knapp, F. F., *Report of Foreign Travel by F.F. Knapp, November 8-15, 1997,* ORNL/FTR-6400 (1997).

Knapp, F. F., *Report of Foreign Travel for F.F. Knapp, April 17-28, 1998,* ORNL/FTR-6546 (1998).

Knapp, F. F., *Report of Foreign Travel for F.F. Knapp, August 25-September 27, 1998,* ORNL/FTR-6697 (1998).

Knapp, F. F., *Report of Foreign Travel for F.F. Knapp, March 24-April 10, 1998,* ORNL/FTR-6529 (1998).

Knapp, F. F., *Report of Foreign Travel for F.F. Knapp, September 12-17, 1998,* ORNL/FTR-6715 (1998).

Kocher, D. C., *Report of Foreign Travel for D.C. Kocher, Mary 23-31, 1997,* ORNL/FTR-6180 (1997).

Kocher, D. C, and other members of Working Group on Principles and Criteria for Radioactive Waste Disposal, *Regulatory Decision Making in the Presence of Uncertainty in the Context of the Disposal of Long Lived Radioactive Wastes,* IAEA-TECDOC-975, International Atomic Energy Agency, Vienna (1997).

Kocher, D. C., *Report of Foreign Travel for D.C. Kocher, March 20-27, 1998,* ORNL/FTR-6523 (1998).

Kocher, D. C., *Report of Foreign Travel for D.C. Kocher, May 22-30, 1998,* ORNL/FTR-6584 (1998).

Kocher, D. C., *Report of Foreign Travel for D.C. Kocher, August 28-September 5, 1998,* ORNL/FTR-6687 (1998).

Korte, N., L. Liang, B. Gu, M. Muck, J. Zutman, R. Schlosser, R. Siegrist, T. Houk, and Q. Fernando, *In Situ Treatmen tof Mixed Contaminants in Groundwater: Application of Zero-valence Iron and Palladized Iron for Treatment of Groundwater Contaminated with TCE and Tc99,* ORNL/TM-13530 (1997).

Korte, N., M. Muck, P. Kearl, R. Siegrist, T. Houk, R. Schlosser, and J. Zutman, *Field Evaluation of a Horizontal Well Recirculation System for Groundwater Treatment: Field Demonstration at X701B Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* ORNL/TM-13529.

Kuritz, T., *Report of Foreign by T. Kuritz, July 12-25, 1998,* ORNL/FTR-6722 (1998).

Kuritz, T., *Report of Foreign by T. Kuritz, March 29 - April 10, 1997,* ORNL/FTR-6139 (1997).

Kuritz, T., *Report of Foreign Travel by T. Kuritz, August 8-26, 1997,* ORNL/FTR-6303 (1997).

Laase, A. D. and J. L. Clausen, *Paducah Gaseous Diffusion Plant Northwest Plume Interceptor System Evaluation,* ORNL/TM-13333.

Lee, D. W., J. R. Forgy, Jr., A. S. Icenhour, D. C. Kocher, S. L. Loghry, D. A. Lombardi, H. W. Godbee, R. J. Luxmoore, M. L. Socolof, J. D. Tauxe, M. L. Tharp, S. Timmins, M. W. Tull, and M. W. Yambert, *Performance Assessment for the Class L-II Disposal Facility,* ORNL/TM-13401 (1998).

Lee, D. W., J. D. Tauze, A. S. Icenhour, D. C. Kocher, and R. J. Luxmoore, *Composite Analysis for Solid Waste Storage Area 6,* ORNL-6929 (1997).

Leggett, R. W., *Report of Foreign Travel by R. W. Leggett, April 20-24, 1998,* ORNL/FTR-6540 (1998).

Lewis, E. B., S. S. Talmage, S. S. Chang, and P. G. Forsyth, *Data Evaluation Report for Beta Exotoxin, MRID 44310304-12; 4423514-16,* ORNL/M-6268.

Lewis, E. B., *Data Evaluation Report for Beta Exotoxin, MRID 44235313,* ORNL/M-6278.

Lewis, E. B., *Data Evaluation Report, Beta Exotoxin, Study Type, Nontarget Insect Testing for Toxicology/Pathogenicity to Insect Predators and Parasites Tier 1 (154-23). MRID No. 44235314, 44310304, 44235308-44235312,44235316,* CHEG-000171 (1997).

Lewis, E. B., *Data Evaluation Report, IRGACARE MP, Study Type, Developmental Toxicity, MRID No. 43820402, 43787101,* CHEG-000361 (1998).

Lewis, E. B., *Data Evaluation Report, Proxel, Study Type, Subchronic Oral Toxicity, MRID No. 42205701,* CHEG-000060 (1998)..

Little, C. A., *Report of Foreign Travel by C.A. Little, May 31 - June 18, 1997,* ORNL/FTR-6216 (1997).

Long, T. L., Data *Evaluation Report, Ethylene Oxide, Study Type, 13-Week Inhalation Neurotoxicity,* CHEG-000262 (1998).

Long, T. L., *Data Evaluation Report, Methoxyfenozide, Study Type, Subchronic Oral Neurotooxicity, MRID No. 44617803,* CHEG-000253 (1998).

Long, T. L., *Data Evaluation Report, Methoxyfenozide, Study Type, Acute Oral Neurotoxicity, MRID No. 44617802,* CHEG-000256 (1998).

Long, T. L., *Data EValuation Report, Ethylene Oxide, Study Type, 4-week Inhalation Range-Finding, MRID No. 44256401,* CHEG-000301 (1998).

Long, T. L., *Data Evaluation Report, Ethylene Oxide, Study Type, Acute Inhalation Neurotoxicity, MRID No. 44256402,* CHEG-000345 (1998).

Long, T. L., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Subchronic Oral Neurotoxicity, MRID No. 44341011,* CHEG-000370 (1998).

Long, T. L., *Data Evaluation Report, Propiconazole, Study Type, Oncogenicity Feeding, MRID No. 44381401*, CHEG-000371 (1998).

Long, T. L., N. B. Monroe, and C. M. Troxel, *Data Evaluation Report, DPX-MP062, Study Type, Subchronic Oral and Developmental Toxicity, and Subchronic Oral Neurotoxicity, MRID No. 44477142, 44477135, 44477129*, CHEG-000315 (1998).

Lowe, K. S., P. McKay, and R. L. Siegrist, *Perspective on the Environmental Conditions and Opportunities in the Republic of Argentina*, ORNL/M-6120 (1997).

Lu, P. Y., *Report of Foreign Travel by P. Y. Lu, January 3-15, 1997*, ORNL/FTR-6071 (1997).

Lu, P. Y., *Report of Foreign Travel for P.Y. Lu, March 26-April 12, 1998*, ORNL/FTR-6526 (1998).

Lyon, B. F., *Prediction of External Corrosion for Steel Cylinders*, ORNL/TM-13359 (1997).

Mansfield, B. K., J. M. Wyrick, A. E. Adamson, D. K. Casey, M. Browne, M. Mills, S. A. Martin, and L. N. Yust, *Human Genome News, Vol. 8, Nos. 3&4, January-June 1997*, ORNL/M-6069 (1997).

Marshall, T. C., *Data Evaluation Report, MCPA ACID. Study Type, Subchronic Oral Dietary Toxicity and Neurotoxicity, MRID No. 43562601*, CHEG-000271 (1998).

Marshall, T. C., *Data Evaluation Report, MCPA-DMA SALT, Study Type, Subchronic Oral Dietary Toxicity and Neurotoxocity, MRID No. 43562701*, CHEG-000273 (1998).

Martin, S., M. Mills, D. Casey, A. Adamson, L. Yust, J. Wyrick, and B. Mansfield, *DOE Human Genome Program Contractor-Grantee Workshop VII*, CONF-990104 (1998).

Mazur, P., *Report of Foreign Travel by P. Mazur, October 30 - November 12, 1997*, ORNL/FTR-0697 (1997).

McKenzie, S. P. and K. S. Brown, *Results of the Radiological Survey of the Excelsior Steel Ball Company, Tonawanda, New York (TNY005)*, ORNL/RASA-97/11 (1998).

McKenzie, S. P. and M. S. Uziel, *Results of the Independent Radiological Verification Survey of Remediation at Building 31, Former Linde Uranium Refinery, Tonawanda, New York (LI001V)*, ORNL/RASA-96/10 (1998).

McKenzie, S. P., M. S. Uziel, and R. F. Carrier, *Radiological Survey Results for the Niagara Mohawk Right-of-Way, Tonawanda, New York (TNY004)*, ORNL/RASA-97/2 (1998).

McKenzie, S. P., M. S. Uziel, and R. F. Carrier, *Radiological Survey Results for the R.P. Adams Company Property, Tonawanda, New York (TNY003)*, ORNL/RASA-97/1 (1998).

McPherson, D. W., *Report of Foreign Travel for D. McPherson, August 25-September 11, 1998*, ORNL/FTR-6698 (1998).

Milanez, S., *Chemical Summary for Sodium Chloride*, ORNL/M-5596 (1997).

Milanez, S., *Chemical Summary for Tartaric Acid*, ORNL/M-5597 (1997).

Milanez, S., *Toxicology Report, Subchronic Toxicity with Reg. No. 242 009 (BAS 490F) in Rats MRID No. 43864245*, ORNL-M-5649 (1997).

Milanez, S., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Chronic Oral Toxicity Feeding-Rat, MRID No. 43864247*, ORNL/M-5666 (1997).

Milanez, S., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Oncogenicity Feeding-Rat, MRID No. 43864249*, ORNL/M-5670 (1997).

Milanez, S., *Data Evaluation Report, Bensulide, Study Type, Metabolism - Rat 85-1) - MRID No. 42225401*, ORNL/M-5671 (1997).

Milanez, S., *Data Evaluation Report, Emamectin, Study Type, Combined Chronic/Oncogenicity Feeding-Rat, MRID No. 43868104*, ORNL/M-5708 (1997).

Milanez, S., *Data Evaluation Report, Kresoxim-Methyl, Study Type: Pharmacology Special Study - Rat, Mouse, Guinea Pig (85-X) - MRID 43364265,* ORNL/M-5742 (1997).

Milanez, S., *Data Evaluation Report, Kresoxim-Methyl, Study Type: Metabolism - Rat (85-1), MRID 43864262, 43864263, 43864264, 43883604,43883605,* ORNL/M-5743 (1997).

Milanez, S., *Data Evaluation for Repelkote™ OC/IC Cartons, MRID No. 44239401 and 44239301*, ORNL/M-6171 (1997).

Milanez, S., *Data Evaluation for MRIS 44344401, XenTari AS; MRID 44336101, GA4/7+BAP 19g/L SL; MRID 44344901, Perlan*, ORNL/M-6175 (1997).

Milanez, S., *Data Evaluation Report for Perlan MRID No. 44344901, 44336101, and 44344902,* ORNL/M-6199 (1997).

Milanez, S., *Data Evaluation Report for Ethoxyquin MRID No. 44222501,* ORNL/M-6233 (1997).

Milanez, S., *Data Evaluation Report for Ethofumesate, MRID No. No. 44156201-02*, ORNL/M-6271 (1997).

Milanez, S., *Data Evaluation Report for Isazofos, MRID 43504506* , ORNL/M-6498.

Milanez, S., *Data Evaluation Report for Perland MRID No. 44344901, 44336101, and 44344902,* ORNL/M-6502.

Milanez, S. and C. Forsyth, *Data Evaluation Report for DuPont MRID No. 44306208,* ORNL/M-6585.

Milanez, S., *Data Evaluation Report, GA4/7BAP 19 g/l SL, Study Type, Physical and Chemical Characteristics, MRID No. 44344902, 44264706-08*, CHEG-000185 (1997).

Milanez, S., *Data Evaluation Report, Ethoxyquin, Study Type, 28-Day Oral Toxicity (Gavage) MRID No. 44222501*, CHEG-000188 (1998).

Milanez, S., *Data Evaluation Report, Dichlormid, Study Type, Subchronic Oral Toxicity, MRID No. 41419401, 225002430*, CHEG-000266 (1998).

Milanez, S., *Data Evaluation Report, Phenmedipham, Study Type, Chronic Oral Toxicity Feeding, MRID No. 00028650*, CHEG-000329 (1998).

Milanez, S., *Data Evaluation Report, XEN TARI AS, Study Type, Storage Stability and Corrosion Characteristics, MRID No. 44336101*, CHEG-000200 (1997).

Miller, I., *Chemical Summary for Phosphoric Acid*, ORNL/M-5584 (1997).

Miller, I., *Chemical Summary for Potassium Sulfate*, ORNL/M-5587 (1997).

Miller, I., *Chemical Summary for Potassium Sodium Tartrate*, ORNL/M-5588 (1997).

Miller, I., *Chemical Summary for Hydrogen Peroxide*, ORNL/M-5589 (1997).

Miller, I., *Chemical Summary for Magnesium Carbonate*, ORNL/M-5590 (1997).

Miller, I., *Chemical Summary for m-Nitrobenzene Sulfonic Acid, Sodium Salt*, ORNL/M-5591 (1997).

Miller, I., *Chemical Summary for Boric Acid*, ORNL/M-5592 (1997).

Miller, I., *Chemical Summary for 1,3-Benzenediol*, ORNL/M-5593 (1997).

Miller, I., *Chemical Summary for Ammonium Hydroxide*, ORNL/M-5594 (1997).

Miller, I., *Chemical Summary for Sodium Persulfate*, ORNL/M-5583 (1997).

Miller, J. C., *Report of Foreign Travel by J.C. Miller, May 22 - June 8, 1997,* ORNL/FTR-6192 (1997).

Miller, R. L., T. J. Blasing, R. O. Johnson, M. Schweitzer, S. M. Adams, C. E. Easterly, and W. P. Staub, *Draft - Environmental Impact Statement for the Jacksonville Electric Authority Circulating Fluidized Bed Combustor Project,* ORNL/M-6569 (1998).

Mirzadeh, S., *Report of Foreign Travel by S. Mirzadeh, June 15-19, 1997,* ORNL/FTR-6215 (1997).

Monroe, N. B., *Data Evaluation Report, Busan, Study Type, Subchronic Oral Toxicity Feeding - Mouse, MRID No. 44364508 and 44369301*, CHEG-000033 (1998).

Monroe, N. B., *Data Evaluation Report, Busan, Study Type, Subchronic Oral Toxicity Feeding - Mouse, MRID No. 44016809-10*, CHEG-000034 (1998).

Monroe, N. B., *Data Evaluation Report, DPX-JW062-69, Study Type, Subchronic Oral Toxicity, MRID No. 44477132*, CHEG-000307 (1998).

Monroe, N. B., *Data Evaluation Report, DPX-JW062-34, Study Type, Subchronic Oral Toxicity, MRID No. 44477133*, CHEG-000311 (1998).

Monroe, N. B., *Data EValuation Report, Thiophanate-Methyl, Study Type, Chronic Oral Toxicity Feeding Rat. MRID No. 00057651*, CHEG-000365 (1998).

Moyer, J. H., *Data Evaluation Report, TBTO (tri-n-butylin oxide), Study Type, Oral Toxicity Feeding - Mouse, MRID No. 41127001*, CHEG-000007 (1998).

Moyer, J. H., Data Evaluation Report, TBTO (tri-n-butyltin-oxide), Study Type, Subchronic Oral Toxicity [Gavage Suspension] - Dog (82-1B), MRID No. 41131001, CHEG-000010, August 1998.

Moyer, J. H., *Data Evaluation Report, Oxyfluorofen, Study Type, Oncogenicity Feeding, MRID No. 37939*, CHEG-000250 (1998).

Moyer, J. H. and K. A. Davidson, *Data Evaluation Report, DPX-JW062-106, Study Type, Chronic Oral toxicity, MRID No. 44477136, 44477131, 44477145*, CHEG-000313 (1998).

Moyer, J. H., T. L. Long, N. B. Monroe, S. S. Chang, B. L. Whitfield, K. A. Davidson, C. M. Troxel, A. A. Francis, C. S. Forsyth, and R. A. Faust, *Data Evaluation Report for DPX, MRID No. 44482003-08, 44477113-51*, CHEG-000219 (1998).

Mural, R. J., *Report of Foreign Travel by R.J. Mural, June 19-26, 1997,* ORNL/FTR-6234 (1997).

Murray, M. E., D. A. Rose, K. S. Brown, R. H. Coe, III , W. Winton, and J. D. Lawrence, *Results of the Measurement Survey of Elevation and Environmental Media in Surface Impoundments 3513 and 3524 at Oak Ridge National Laboratory, Oak Ridge, TN,* ORNL/RASA-98/5 (1998).

Murray, M. E., D. A. Rose, K. S. Brown, W. Winton, R. A. Dean, and R. H. Coe, III, *Results of the Radiological and Chemical Characterization of Surface Impoundments 3539 and 3540 at Oak Ridge National Laboratory, Oak Ridge, TN,* ORNL/RASA-98/4 (1998).

Murray, M. E., R. E. Rodriguez, and M. S. Uziel, *Results of the Radiological Survey at Two Mile Creek, Tonawanda, New York (TNY002),* ORNL/RASA-96/9 (1997).

Murray, M. E., V. P. Patania, and C. A. Johnson, *Results of the Independent Radiological Verification Survey at B&T Metals, 425 West Town Street, Columbus, OH (CO001V),* ORNL/RASA-96/8 (1997).

Niyogi, S. K., *Report of Foreign Travel by S. K. Niyogi, December 5-23, 1997,* ORNL/FTR-6461 (1998).

Norris, J. C., *Data Evaluation Report, Tybufenpyrad, Study Type, Chronic Oral Toxicity Capsule, MRID No. 43309315*, ORNL/M-5121 (1997).

Norris, J. C., *Data Evaluation Report, MAXON IV, Study Type, Product Identity and Disclosure of Ingredients, MRID No. 43983001*, ORNL/M-5338 (1997).

Norris, J. C., *Data Evaluation Report, Aminoethoxyvinylglycine Hydrochloride, Study Type, Freezer Storage Stability Study of A-800009 in Apple Processed Commodities (153B-3C)- MRID No. 43846504*, ORNL/M-5558 (1997).

Norris, J. C., *Data Evaluation Report, Aminoethoxyvinylglycine Hydrochlorde, Study Type, HPLC Method for the Analysis of L-Alpha-(2-Aminoethoxyvinyl)glycine Hydrochloride (A-80009) in Apple Juice - MRID No. 44082102*, ORNL/M-5559 (1997).

Norris, J. C., *Data Evaluation Report, Aminoethoxyvinylglycine Hydrochloride, Study Type, Enforcement Method Verification for the Analysis of A-80009 in Apple Juice and Apple RAC as per PR-88-5 (153B-3B) - MRID No. 43846502*, ORNL/M-5560 (1997).

Norris, J. C., *Data Evaluation Report, Aminoethoxyvinylglycine Hydrochloride, Study Type, HPLC Method for the Analysis of L-Alpha-(2-Aminoethoxyvinyl)glycine Hydrochloride (A-800009) in Apple - MRID No. 44082101*, ORNL/M-5561 (1997).

Norris, J. C., *Data Evaluation Report, Aminoethoxyvinylglycine Hydrochloride, Study Type; Freezer Storage Stability Study of A-80009 in Apple RAW Agricultural Commodity (153B-3C) - MRID No. 43846505*, ORNL/M-5562 (1997).

Norris, J. C., *Data Evaluation Report, Aminoethocyvinylglycine Hydrochloride, Study Type, PR Notice 88-5 Enforcement Method Verification for the Analysis of A-80009 in Apple RAC and Apple Juice (153B-3b), MRID No. 43846503*, ORNL/M-5564 (1997).

Norris, J. C., *Data Evaluation Report, Foli-R-Fos 400, Study Type, Analysis of Sample (151B-13) Certification of Ingredients Limits, MRID No. 43905802*, ORNL/M-5711 (1997).

Norris, J. C., *Data Evaluation Report, Foli-R-Fos 400, Study Type, Product Identity and Disclosure of Ingredients, Manufacturing Process Discussion of the Formation of Unintentional Ingredients, MRID No. 43905801*, ORNL/M-5712 (1997).

Norris, J. C., *Data Evaluation Report, Foli-R-Fos 400, Study Type, Physical and Chemical Properties, MRID No. 43905803*, ORNL/M-5713 (1997).

Norris, J. C., *Data Evaluation Report, Skin So Soft Moisturizing Outdoor Protection After Sun Spray - MRID No. 43902304*, ORNL/M-5715 (1997).

Norris, J. C., *Data Evaluation Report, Skin So Soft Moisturizing Outdoor Protection After Sun Spray, MRID No. 43902302*, ORNL/M-5716 (1997).

Norris, J. C., *Data Evaluation Report, Skin So Soft Moisturizing Outdoor Protection After Sun Spray, MRID No. 43902301*, ORNL/M-5718 (1997).

Norris, J. C., *Data Evaluation Report, Skin So Soft Moisturizing Outdoor Protection After Sun Spray, Study Type, Preliminary Analysis of Product Samples, Certification of Ingredient Limits, Analytical Methods to Verify Certiofie*, ORNL/M-5720 (1997).

Norris, J. C., *Data Evaluation Report, Skin So Soft Moisturizing Outdoor Protection After Sun Spray, Study Type, Preliminary Analysis of Product Samples, MRID No. 43941901*, ORNL/M-5721 (1997).

Norris, J. C., *Data Evaluation Report, Babolna Insect Attractant Trap, Study Type: Analysis and Certification of Product Ingredients (62-1, 62-2, 62-3) - MRID 44041701,* ORNL/M-5740 (1997).

Norris, J. C., *Data Evaluation Report, Sulfuryl Fluoride, Study Type: Chronic Inhalation Toxicity - Dog - MRID 43354901,* ORNL/M-5745 (1997).

Norris, J. C., *Data Evaluation Report, Babolna Insect Attractant Trap, Study Type: Physical and ChemicalCharacteristics (63-1 to 63-21) - MRID 44041702,* ORNL/M-5749 (1997).

Norris, J. C., *Data Evaluation Report, Babolna Insect Attractant Trap, Study Type: Analysis and Certification of Product Ingredients (6-1, 62-2, 62-3) - MRID 44108001,* ORNL/M-5750 (1997).

Norris, J. C., *Data Evaluation Report, Cytoplex HMS, Study Type, Product Identity and Disclosure of Ingredients, Manufacturing Process, Discussion of Formation of Impurities, Analysis of Samples and Certification of Limits, Analytical Method,* ORNL/M-5769 (1997).

Norris, J. C., *Data Evaluation Report, NEU 1165M, Study Type, Analysis and Certification, MRID No. 44131901*, ORNL/M-5770 (1997).

Norris, J. C., *Data Evaluation Report, Falgro 4L, Study Type: Certification of Limits and Analytical Methods for Certified Limits (151-15 and 151-16) - MRID 44081202, 44081201, 44081101, 44081103, 44081301, 44081302, 44081303, 44081305, 44081102,* ORNL/M-5794 (1997).

Norris, J. C., *Data Evaluation Report, MFG-PG-56, Study Type: Product Identity and Disclosure of Ingredients, Manufacturing Process, and Discussion of Formation of Impurities (Series 61-1, 61-2, 61-3) - MRID 44079901, 44079902, 44079903,* ORNL/M-5795 (1997).

Norris, J. C.; *Data Evaluation Report, A9497B, Study Type: Product Identity and Disclosure of Ingredients, Manufacturing Process, Discussion of Formation of Impurities, Analaysis of Samples and Certification of Limits, Analytical Methods, and Physical and Chemical Properties - MRID 44160206,* ORNL/M-5796 (1997).

Norris, J. C., *Data Evaluation Report, Rose Chafer Floral Lure, Study Type: Physical and Chemical Properties (151B-17) - MRID 44089102, 44089101,* ORNL/M-5797 (1997).

Norris, J. C., *Data Evaluation Report, Phosphine, Study Type, Acute Inhalation Neurotoxicity, MRID No. 44139001*, ORNL/M-6272 (1997).

Norris, J. C., *Data Evaluation Report for Game Stop, MRID 44036401-02/44127701,* ORNL/M-6273 (1997).

Norris, J. C., *Data Evaluation Report for Dupont, MRID 44075852/44075855,* ORNL/M-6274.

Norris, J. C., *Data Evaluation Report for Dupont MRID 44075859-60* , ORNL/M-6275.

Norris, J. C., *Data Evaluation Report, A9497B, Study Type, Product Identity and Disclosure of Ingredients, Manufacturing Process, Discussion of Formation of Impurities, MRID No. 44160206*, ORNL/M-6288 (1997).

Norris, J. C., *Data Evaluation Report for Phosphine, MRID 44139001,* ORNL/M-6666.

Norris, J. C., *Report of Foreign Travel by J. C. Norris, Jr., March 21-30, 1997,* ORNL/FTR-6120 (1997).

Norris, J. C., *Data Evaluation Report, MFG-PG-56, Study Type, Product Identity and Disclosure of Ingredients. Manufacturing Process and Discussion of Formation of Impurities, Analysis of Samples, MRID No. 44079901-44079903*, CHEG-000157 (1997).

Norris, J. C., *Data Evaluation Report, Phosphine, Study Type, Acute Inhalation Neurotoxicity, MRID No. 44139001*, CHEG-000158 (1997).

Norris, J. C., *Data Evaluation Report, Rose Chafer Cloral Lure, Study Type, Physical and Chemical Properties, MRID No. 44089102*, CHEG-000173 (1997).

Nourse, B. D., S. E. Stinnette, and B. Ladd, *Report on the Remedial Investigation of Upper East Fork Poplar Creek Characterization Area at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Volume 5. Appendix F - Baseline Human Health Risk Assessment Report,* ORNL/M-6130 (1997).

Nourse, B. D., *Data Evaluation Report, PAK tm 27, Study Type, Enforcement Analytical Method, MRID No. 44593001-3*, CHEG-000360 (1998).

Nourse, B. D., *Data Evaluation Report, BQ 1416MD-5 Biocide, Study Type, Product Identify and disclosure of Ingredients, Description of Beginning Materials & Manufacturing Process. MRID No. 44670201, 44670202*, CHEG-000290 (1998).

Opresko, D. M. and R. A. Faust, *Health Risk Assessment for the Nerve Agent GB*, ORNL/M-5290 (1997).

Opresko, D. M. and R. A. Faust, *Health Risk Assessment for Sulfur Mustard (HD)*, ORNL/M-5294 (1997).

Opresko, D. M., *Health Risk Assessment for the Nerve Agent GA*, ORNL/M-5295 (1997).

Opresko, D. M., *Chemical Summary for 2-Butoxyethanol*, ORNL/M-5600 (1997).

Opresko, D. M., *Chemical Summary for Fluoroboric Acid (Fluoride)*, ORNL/M-5601 (1997).

Opresko, D. M., *Chemical Summary for Hydrazine*, ORNL/M-5602 (1997).

Opresko, D. M., *Chemical Summary for Isopropanol*, ORNL/M-5603 (1997).

Opresko, D. M. and R. Faust, *Health Risk Assessment for the Nerve Agent VX*, ORNL/M-5739 (1997).

Opresko, D. M., *Data Evaluation Report, Safety - INS 48.2, Study Type, Companion Animal Safety-Dog, MRID No. 44128307*, CHEG-000258 (1998).

Opresko, D. M., *Data Evaluation Report, Safety - INS 54.3, Study Type, Companion Animal Safety - Cat, MRID No. 44128308C*, CHEG-000260 (1998).

Opresko, D. M., *Data Evaluation Report, Zema Z763, Study Type, Companion animal Safety, MRID No. 44295901*, CHEG-000274 (1998).

Opresko, D. M., *Data Evaluation Report, Amitraz-pyriproxyfen Collars, Study Type, Companion Animal Safety, MRID No. 44527902*, CHEG-000342 (1998).

Opresko, D. M., *Data Evaluation Report, Diazinon-pyriproxyfen Collars, Study Type, Companion Animal Safety, MRID No. 44522102*, CHEG-000343 (1998).

Opresko, D. M., *Data Evaluation Report, Ecto Flea and Tick Insecticible with IGR, Study Type, Companion Animal Safety, MRID No. 44412601*, CHEG-000344 (1998).

Opresko, D. M., E. L. Etnier, J. F. King, and A. P. Watson, *Chemical Warfare Material Unique Regulatory Issues* (1998).

Pinnaduwage, L. A., *Report of Foreign Travel for L.A. Pinnaduwage, June 26-July 12, 1998*, ORNL/FTR-6635 (1998).

Reichle, D. E., P. S. Rohwer, and A. W. Buttrum, *FY 1996 ORNL Research and Technical Support Programs Funded by the Assistant Secretary of Environment, Safety, and Health*, ORNL/M-5809 (1997).

Rodriguez, R. E. and C. A. Johnson, *Results of the Independent Radiological Verification Survey at the Former Chapman Valve Manufacturing Company, Indian Orchard, Massachusetts (CIO001V)*, ORNL/RASA-95/17 (1997).

Selby, P. B., *Data Evaluation Report for Diethatyl, MRID No. 4124805-06*, ORNL/M-6230.

Selby, P. B., *Data Evaluation Report, DPX-R6447-50, Study Type, Supplement No. 1 to the 13 week dog Mechanistic Study, MRID No. 44306209*, CHEG-000257 (1998).

Selby, P. B., *Data Evaluation Report, DPX-R6447-50, Study Type, 13-Week Dog Mechanistic Study, MRID No. 44111202*, CHEG-000372 (1998).

Spangler, W. J., *Data Evaluation Report, Busan 1157, Study Type, Dermal Absorption - Rat (85-2), MRID No. 44016817*, CHEG-000014 (1998)..

Spangler, W. J., *Data Evaluation Report, Oxyfluorofen, Study Type, Dermal Absorbtion, MRID No. 92136107*, CHEG-000254 (1998).

Spangler, W. J., *Data Evaluation Report, SKW20010, Study Type, 28-Day Dietary Range Finding, MRID No. 44359528, 44394614, 44359526, 44394613, 44394614, 44359531, 44359528*, CHEG-000303 (1998).

Spangler, W. J., *Data Evaluation Report, Triclosan, Study Type, Developmental mouse, MRID No. 43787102, 43817502, 43817501*, CHEG-000321 (1998).

Talmage, S. S., *Chemical Summary for Stannous Chloride and Stannous Chloride as Tin*, ORNL/M-5595 (1997).

Talmage, S. S., *Ecological Criteria Document for 2-Amino-4,6-Dinitrotoluene (CAS No. 35572-78-2)*, ORNL/M-5653 (1997).

Talmage, S. S., *Ecological Criteria Document for 3,5-Dinitroaniline (CAS No. 618-87-1)*, ORNL/M-5655 (1997).

Talmage, S. S., *Data Evaluation Report, Agroneem, Study Type, Subchronic Oral Toxicity Gavage - Rat, MRID No. 44146913*, ORNL/M-5768 (1997).

Talmage, S. S. and E. B. Lewis, *Data Evaluation Report, CRY9C Protein, Study Type, NonGuideline, Acute Toxicity Test With Daphnia Magna, MRID No. 44271502*, ORNL/M-6184 (1997).

Talmage, S. S., *Data Evaluation Report, PTB Technical, Study Type, Acute Oral Toxicity Study with the Northern Bobwhite, MRID No. 43653808*, ORNL/M-6186 (1998).

Talmage, S. S., *Proposed Acute Exposure Guideline Levels (AGELs) for Chlorine,* ORNL/M-6240.

Talmage, S. S., *Proposed Acute Exposure Guideline Levels (AGELs) for Aniline,* ORNL/M-6241.

Talmage, S. S., *Data Evaluation Report for Amitraz, MRID 41090502-06,* ORNL/M-6256 (1997).

Talmage, S. S., *Data Evaluation Report for Diquat Dibromide MRID 40210402-07,* ORNL/M-6257 (1998).

Talmage, S. S., *Data Evaluation Report, Amitraz, Study Type, Acute Oral, Dermal, and Inhalation Toxicity, Primary Dermal Irritation,* ORNL/M-6280 (1998).

Talmage, S. S., *Data Evaluation Report for Cryolite MRID 00138096-97, 00128106-07, 138097,* ORNL/M-6281 (1998).

Talmage, Sylvia S., *Data Evaluation Report, Boric Acid, MRID No. 42099401-03 and 43685203-06*, ORNL/M-6282 (1997).

Talmage, S. S., *Data Evaluation Report for RUC #724 MRID 44026901-06,* ORNL/M-6283 (1998).

Talmage, S. S., *Data Evaluation Report for Multicide MRID 43791301-06,* ORNL/M-6284 (1998).

Talmage, S. S., *Data Evaluation Report for Amitraz MRID 44388505-09,* ORNL/M-6394.

Talmage, S. S. and P. G. Forsyth, *Data Evaluation Report for Diclotophos MRID No. 44296101, 44328401,* ORNL/M-6406.

Talmage, S. S. and P. Forsyth, *Data Evaluation Report for CRY9C Protein MRID No. 44384302-03, 44161701, and 44384301,* ORNL/M-6418.

Talmage, S. S., *Data Evaluation Report for Boric Acid MRID 42099401-03, 43685203-06,* ORNL/M-6667.

Talmage, S. S., *Data Evaluation Report, Oxamyl, Study Type, Subchronic Oral Nuerotoxicity - Rat (87-7), MRID No. 44504901*, CHEG-000020 (1998).

Talmage, S. S., *Nitroaromatic Munition Compounds Environmental Effects and Screening Values*, CHEG-000055 (1998).

Talmage, S. S., *Data Evaluation Report, Coumaphos, Study Type, Acute Oral Neurotoxicity and Acute Delayed Neurotoxicity (Dermal) MRID No. 44544801 - 44544803*, CHEG-000101 (1998).

Talmage, S. S., *Data Evaluation Report, Nimbecidine, Study Type, Environmental Effects (Non-Guideline), MRID No. 44380607 and 44380609*, CHEG-000105 (1998).

Talmage, S. S., *Data Evaluation Report, CRYIA (B) PROTEIN, Study Type, Non-Guideline Study, MRID No. 44271501*, CHEG-000169 (1997).

Talmage, S. S., *Data Evaluation Report, Amitraz, Study Type, Acute Oral, Dermal, Inhalation Toxicity and Primary Dermal Irritation. MRID No. 44388505-9*, CHEG-000175 (1998).

Talmage, S. S., *Data Evaluation Report, Amitraz, Study Type, Acute Oral, Dermal, Inhalation Toxicity, Primary Eye, Dermal, Irritation and Dermal Sensitization, MRID No. 41090502-6*, CHEG-000189 (1998).

Talmage, S. S., *Data Evaluation Report, Cryolite, Study Type, Acute Oral, Dermal Inhalation Toxicity, Primary Eye, Dermal Irritation and Dermal Sensitization, MRID No. 138096, 128106-8, 138097*, CHEG-000198 (1998).

Talmage, S. S. *Data Evaluation Report, MCPA, Study Type, Acute Oral Neurotoxicity, MRID No. 43562602, 43556701*, CHEG-000318 (1998).

Talmage, S. S., S. S. Chang, and P. G. Forsyth, *Data Evaluation Report, Beta Exotoxin, Study Type, Larval Honeybee Toxicity/Pathogenicity, MRID No. 4430304*, ORNL/M-6268 (1998).

Tharpe, D., *Oak Ridge Environmental Information System (OREIS) Procedures; Accessing, Processing, and Loading Externally Generated into OREIS,* ORNL/M-5855 (1997).

Trivelpiece, A., B. Appleton, C. West, and R. Mann, *ORNL Review, Vol. 31, Nos. 1-2, 1998,* ORNL/M-6631 (1998).

Troxel, C. M., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Developmental-Rabbit, MRID No. 43864252*, ORNL/M-5669 (1997).

Troxel C. M., *Data Evaluation Report, DuPont R6447, Study Type, Developmental-Rabbit, MRID No. 44075854*, ORNL/M-5772 (1997).

Troxel, C. M., *Data Evaluation Report, DuPont R6447, Study Type: Subchronic Oral Toxicity Feeding - Mouse (82-1a) - MRID 44085602,* ORNL/M-5787 (1997).

Troxel, C. M., *Data Evaluation Report, DuPont R6447, Study Type: Subchronic Oral Toxicity Feeding - Dog (82-lb) MRID 44075851,* ORNL/M-5804 (1997).

Troxel, C. M., *Data Evaluation Report, DuPont R6447, Study Type: Subchronic Oral Toxicity Feeding - Mouse (82-1a) MRID 44085602,* ORNL/M-5805 (1997).

Troxel, C. M., *Data Evaluation Report for Propylene Oxide, MRID No. 41750801*, ORNL/M-6172 (1997)

Troxel, C. M., *Data Evaluation Report, Propylene Oxide, Study Type, Chronic Inhalation/Oncogenicity, MRID No. 42039901*, ORNL/M-6234 (1998).

Troxel, C. M., *Data Evaluation Report for Endothall MRID No. 41040301 42039901,* ORNL/M-6235.

Troxel, C. M., *Data Evaluation Report, Avermectin, Study Type, Developmental- Mouse (nonguideline)*, CHEG-000035 (1998).

Troxel, C. M., *Data Evaluation Report, EPTC, Study Type, Combined Chronic/ Oncogenicity Feeding-Rat, MRID No. 40215001*, CHEG-000040 (1998).

Troxel, C. M., *Data Evaluation Report, Gylcolic Acid, Study Type, Developmental Toxicity - Rat, MRID No. 44589501*, CHEG-000048 (1998).

Troxel, C. M., *Data Evaluation Report, EPTC, Study Type, Combined Chronic/ Oncogenicity Feeding-Rat, MRID No. 40215001*, CHEG-000081 (1998).

Troxel, C. M., *Data Evaluation Report, NIPACIDE, Study Type, Subchronic Dermal Toxicity-Rat, MRID No. 42470301*, CHEG-000088 (1998).

Troxel, C. M., *Data Evaluation Report, Endothall, Study Type, Combined chronic/oncofenicity feeding, MRID No. 414040301*, CHEG-000194 (1998).

Troxel, C. M., *Data Evaluation Report, EPTC, Study Type, Combined Chronic/Oncogenicity Feeding, MRID No. 40215001*, CHEG-000327 (1998).

Tuskan, G. A., L. E. Gunter, T. J. Tschaplinski, and F. W. Larimer, *The Isolation of DNA Sequences Determining Gender in the Plant Family Salicacaea,* ORNL/M-6364 (1997).

Vo-Dinh, T., *Report of Foreign Travel by T. Vo-Dinh, August 20-September 2, 1997,* ORNL/FTR-6290 (1997).

Vo-Dinh, T., *Report of Foreign Travel for T. Vo-Dinh, March 21-April 1, 1998,* ORNL/FTR-6525 (1998).

Wachter, E. A., J. E. Parks, and G. R. Eater, *CRADA Final Report for CRADA Number ORNL95-0352, Finish and Moisutre Measurements in Fiber Manufacturing,* ORNL/M-6074 (1997).

West, O. R., S. R. Cline, W. L. Holden, F. G. Gardner, B. M. Schlosser, J. E. Thate, D. A. Pickering, and T. C. Houk, *A Full Scale Demonstration of In Situ Chemical Oxidation Through Recirculation at the X-701B Site, Field Opertions and TCE Degradation,* ORNL/TM-13556 (1997).

Whitfield, B. L., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Salmonella/Mammalian Activation, Gene Mutation, MRID No. 43864254*, ORNL/M-5656 (1997).

Whitfield, B. L., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Mammalian Cells in Culture, Gene Mutation, MRID No. 43864255*, ORNL/M-5657 (1997).

Whitfield, B. L., *Data Evaluation Report, Kresoxim-Methyl, Study Type, In Vitro Chromosomal Aberratons, MRID No. 43864256*, ORNL/M-5658 (1997).

Whitfield, B. L., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Micronucleus, MRID No. 43864257*, ORNL/M-5659 (1997).

Whitfield. B. L., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Salmonella/ Mammalian Activation, Gene Mutation, MRID No. 43864258*, ORNL/M-5660 (1997).

Whitfield, B. L., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Unscheduled DNA Synthesis, MRID No. 43864259*, ORNL/M-5661 (1997).

Whitfield, B. L., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Unscheduled DNA Synthesis, MRID No. 43864260*, ORNL/M-5662 (1997).

Whitfield, B. L., *Data Evaluation Report, Kresoxim-Methyl, Study Type, Unscheduled DNA Synthesis, MRID No. 43864261*, ORNL/M-5663 (1997).

Whitfield, B. L., *Data Evaluation Report, GG-1000, Study Type, Growth Temperature Determination, MRID No. 43973909*, ORNL/M-5729 (1997).

Whitfield, B. L., *Data Evaluation Report, GG-1000, Study Type, Product Manufacturing, MRID No. 43973901*, ORNL/M-5730 (1997).

Whitfield, B. L., *Data Evaluation Report, GG-1000, Study Type, Genetic Analysis, MRID No. 43973905*, ORNL/M-5731 (1997).

Whitfield, B. L., *Data Evaluation Report, GG-1000, Study Type, Product Analysis, MRID No. 44015301*, ORNL/M-5732 (1997).

Whitfield, B. L., *Data Evaluation Report, GG-1000, Study Type, Toxin Production, MRID No. 43973907*, ORNL/M-5733 (1997).

Whitfield, B. L., *Data Evaluation Report, GG-1000, Study Type, Selective Media Development, MRID No. 43973906*, ORNL/M-5734 (1997).

Whitfield, B. L., *Data Evaluation Report, Gibberellic Acid, MRID No. 44129801-03*, ORNL/M-5736 (1997).

Whitfield, B. L., *Data Evaluation Report, Agroneem, Study Type, Salmonella/Mammalian Activation Gene Mutation Assay, MRID No. 44146912*, ORNL/M-5767 (1997).

Whitfield, B. L., *Data Evaluation Report, Gibberellic Acid, Study Type: Mammalian Cells in Culture; Gene Mutation (84-2) - MRID 44129801, 44129802, 44129803,* ORNL/M-5793 (1997).

Whitfield, B. L., *Data Evaluation Report for Isazofos, MRID No. 43504511*, ORNL/M-6170 (1997).

Whitfield, B. L., *Data Evaluation Report, Biollethrin, Study Type, Micronucleus, MRID No. 001333570*, ORNL/M-6182 (1998).

Whitfield, B. L., *Data Evaluation Report for GA 4/7 MRID 44264711-13* , ORNL/M-6195.

Whitfield, B. W., *Data Evaluation Report for Amicochlor and Butachlor MRID No. 41298901 and 0018076-77,* ORNL/M-6231 (1997).

Whitfield, B. L., *Data Evaluation Report, Dupont, MRID No. 44075860,* ORNL/M-6275 (1997).

Whitfield, B., *Data Evaluation Report for Endothall MRID 41700301-03 and 92057009,* ORNL/M-6285.

Whitfield, B. and R. Brothers, *Data Evaluation Report for Trichloron, MRID No. 44479409-11, 41571302, 40306901, 40654306, 43259201, 42467401, 42891301 and 43103001, 4151302, 40306901, 257599,* ORNL/M-6396.

Whitfield, B. L., S. H. Chang, P. B. Selby, and S. Milanez, *Data Evaluation Report for Tetrachlorovinphos MRID No. 41222504-07, 138933, 44358501, 44363202, 42981001, 41377902, 43260901-06, 41223601-05, 41223601-05, 118267-118268, 44295201, 4281001-02, 44362902, 44362802, 40701901-05, 41778601-06, 44362802, and 44363602-05,* ORNL/M-6404.

Whitfield, B. and R. Brothers, *Data Evaluation Report for RUC #1574 (Deltamethrin 1.36% Conc.) MRID No. 4446604-09, 4446104-10, 4445904-10, 444464604-10, 4321201-06, and 43261001-06,* ORNL/M-6407.

Whitfield, B. and R. Brothers, *Data Evaluation Report for Nimbecidine, MRID No., 4438061-02 and 44469303,* ORNL/M-6409.

Whitfield, B. L., *Data Evaluation Report, Thiophanate-methyl, Study Type, Rodent Dominant Lethal In Mice, MRID No. 00055940,* CHEG-000008 (1998).

Whitfield, B. L., *Data Evaluation Report, Dupont R6447, Study Type, Salmonella/ Mammalian Activation; Gene Mutation, MRID No. 44306207,* CHEG-000058 (1998).

Whitfield, B. L., *Data Evaluation Report, SKW20010, Study Type, In Vitro Chromosomal Aberration (84-2), MRID No. 44394618,* CHEG-000085 (1998).

Whitfield, B. L., *Data Evaluation Report, BL-1157, Study Type, In Vivo Mammalian Cytogenetics-Micronucleus Assay in Mice. MRID No. 44016813,* CHEG-000102 (1998).

Whitfield, B. L., *Data Evaluation Report, 1,2-Ethanediamine, Polymer, Study Type, In Vivo Mammalian Cytogenetics-Micronucleus Assay in Mice, MRID No. 44016813-44016815,* CHEG-000106 (1998).

Whitfield, B. L., *Data Evaluation Report, Sodium Dimethyldithiocarbamate, In Vitro Sister Chromatid Exchange Assay in Chinese Hamster Ovary (CHO) Cells,* CHEG-000135 (1998).

Whitfield, B. L., *Data Evaluation Report, Sodium Dimethyldithiocarbamate, Mammalian Cells in Culture Gene Mutation Assay in Chinese Hamster Ovary CHO Cells,* CHEG-000136 (1998).

Whitfield, B. L., *Data Evaluation Report, BL-1157, Study Type, Mammalian Cells in Culture; Gene Mutation (84-2) MRID No. 44016815 and 44016814,* CHEG-000137 (1998).

Whitfield, B. L., *Data Evaluation Report, Nimbecidine, Study Type, Salmonella/ Mammalian Activation; Gene Mutation (84-2). MRID No. 42346101-42346103,* CHEG-000143 (1998).

Whitfield, B. L., *Data Evaluation Report, GA 4/7, Study Type, Mammalian Cells in Culture Assay in L5178Y Mouse Lymphoma Cells, MRID No. 44264712,* CHEG-000154 (1997).

Whitfield, B. L., *Data Evaluation Report, Endothall, Study Type, Deferential Growth Inhibition/Killing in Repair Proficient and Deficient Bacteria, MRID No. 41700301-3 and 92057009,* CHEG-000206 (1998).

Whitfield, B. L., *Data Evaluation Report, Captan, Study Type, In Vivo Mammalian Cytogenetics, DNA Binding in the Mouse, In Vitro DNA Binding, MRID No. 43393501 and 43405102,* CHEG-000210 (1998).

Whitfield, B. L., *Data Evaluation Report, Bifenazate, Study Type, In vitro Mammalian Cytogenetics Chromosomal Aberrations, Micronucleus, Mammalian Cells in Culture, Samonella/Mammalian Activation, MRID No. 44464947- 44464950,* CHEG-000268 (1998).

Whitfield, B. L., *Data Evaluation Report, DPX-MP062, Study Type, Salmonella/ Escherichia/Mammalian Activation Gene Mutation Assay, MRID No. 44477150, 44477149*, CHEG-000305 (1998)

Whitfield, B. L., C. M. Troxel, and M. L. Daugherty, *Data Evaluation Report, DPX-MP062, Study Type, Other Genotoxicity Unscheduled DNA Synthesis in Primary Rat, In Vivo Mammalian Cytogenetics, Multigeneration Reproduction, Devel. Toxicity, MRID No. 44477151, 44477146-48*, CHEG-000306 (1998).

Whitford, B., *Data Evaluation Report for Cobra 44396802-03*, ORNL/M-6291.

Whitford, B., *Data Evaluation Report for PCNB 43759901-06*, ORNL/M-6671.

Whitford, B., *Data Evaluation Report for Scorcher MRID 44392603-08,* ORNL/M-6289.

Wilson, J. W., F. A. Cucinotta, T. D. Jones, and C. K. Chang, *Astronaut Protection from Solar Event of August 4, 1972,* ORNL/M-6339 (1997).

Wilson, J. W., J. L. Shinn, L. C. Simonsen, F. A. Cucinotta, R. R. Dubey, W. R. Jordan, T. D. Jones, C. K. Chang, and M. Y. Kim, *Exposures to Solar Particle Events in Deep Space Missions,* ORNL/M-6223 (1997).

Wilson, L. A., *Chemical Summary for Polyalkyleneoxide Modified Polydimethylsiloxane*, CHEG-000072 (1998).

Wilson, L. A., *Data Evaluation Report, Terrazole, Study Type, Chronic Feeding - Dog (83-1b), MRID No. 00001697*, CHEG-000068 (1998).

Wilson, L. A., *Design for the Environment Chemical Summary for Sodium Gluconate (food grade)*, CHEG-000076 (1997).

Wilson, L. A., *Design for the Environment Chemical Summary for Trisodium Nitrilotriacetate*, CHEG-000079 (1997).

Wilson, L. A., *Design for the Environment Chemical Summary for Trisodium Hydroxyethylene Diaminetrriacetate*, CHEG-000070 (1998).

Wilson, L. A., *Design for the Environment, Chemical Summary for Polyethylene NonPhenyl, Branched Ether Phosphate*, CHEG-000073 (1997).

Wilson, L. A., *Design for the Environment, Chemical Summary for Ethylene Oxide*, CHEG-000069 (1998).

Wilson, L. A., *Design for the Environment, Chemical Summary for Stearamido Propyl-dimethyl-b-Hydroxy-ethyl Ammonium Nitrate*, CHEG-000071 (1998).

Wilson-Nichols, M. J., J. E. Davidson, R. L. Coleman, J. E. Wilson, P. V. Egidi, and L. M. McDowell-Boyer, *Independent Verification of Plutonium Decontamination on Johnston Atoll (1992-1996),* ORNL/TM-13397 (1998).

Young, R. A. and D. M. Opresko, *Deriving Toxicity Values for Organophosphate Nerve Agents*, ORNL/M-5290 (1997).

Young, R. A., *Health Risk Assessment for Nerve Agent GD (Soman)*, ORNL/M-5291 (1997).

Young, R. A., *Health Risk Assessment for Lewisite*, ORNL/M-5293 (1997).

Young, R. A., *Health Risk Assessment for Agent HT*, ORNL/M-5650 (1997).

Young, R. A., *Health Risk Assessment for Agent T*, ORNL/M-5651 (1997).

Young, R. A., *Health Risk Assessment for Agent HN2*, ORNL/M-5652 (1997).

Young, R. A., *Data Evaluation Report, Fosthiazate and Metabolite 2 (BSA), Study Type, Metabolism-Rat, MRID No. 43534516*, ORNL/M-5672 (1997).

Young, R. A., *Data Evaluation Report: DuPont-R6447, Study Type: Dermal Absorption - Rat (85-2) - MRID 44075861,* ORNL/M-5737 (1997).

Young, R. A., *Data Evaluation Report, Fosthiazate, Study Type: Metabolism - Rat (85-1), MRID 43534511, 43534513, 43534515 43864264, 43883604, 43883605,* ORNL/M-5744 (1997).

Young, R. A., *Proposed Acute Exposure Guideline Levels (AGELs) for Dimethylhydra-zine,* ORNL/M-6239 (1998).

Young, R. A., *Proposed Acute Exposure Guideline Levels (AGELs) for Arsine,* ORNL/M-6242 (1998).

Young, R. A., *Proposed Acute Exposure Guideline Levels (AGELs) for Methylhydrazine,* ORNL/M-6243 (1998).

Young, R. A., *Proposed Acute Exposure Guideline Levels (AGELs) for Hydrazine,* ORNL/M-6245 (1998).

Young, R. A., *Data Evaluation Report, MCPA-DMA Salt, MRID No. 44193901,* ORNL/M-6272 (1998).

Young, R. A., *Data Evaluation Report for Endothall, MRID 44263501,* ORNL/M-6276 (1997).

Young, R. A., *Data Evaluation Report for Niclosamide MRID No. 42552312 and 42552205-09,* ORNL/M-6403 (1998).

Young, R. A., *Data Evaluation Report, MCPA-DMA SALT, Study Type, Metabolism, MRID No. 44193901,* CHEG-000113 (1998).

Young, R. A., *Data Evaluation Report, Isazofos, Study Type, Metabolism, MRID No. 43667301 and 43504508 and 43504507,* CHEG-000162 (1997).

Young, R. A., *Data Evaluation Report, Chlorpyrifos-Methyl, Study Type, Metabolism, MRID No. 00029484,* CHEG-000205 (1998).

Young, R. A., *Data Evaluation Report, MCPA-2-EH-ESTER, Study Type, Acute Oral Neurotoxicity, MRID No. 43556702,* CHEG-000272 (1998).

Young, R. A., *Data Evaluation Report, Propoxur. Study Type, Subchronic Oral Toxicity Feeding, MRID No. 44373301,* CHEG-000368 (1998).

Zeighami, E. A., P. F. Goldberg, and K. M. Spencer, *The LEADIS System - A Computerized Evaluation System for Estimating Potential Residual Site Contamination at Decommissioned Nuclear Material Use Sites,* ORNL/M-5654 (1997).

Presentations, CY 1997–1998

Adams, V., M. Bennett, L. Bishop, K. Deacon, T. Mims, R. Sheely, K. L. Yuracko, P. B. Selby, G. D. Kerr, M. J. Gresalfi, C. Johnson, and C. Goddard, "U.S. Department of Energy National Center of Excellence for Metals Recycle," presented at the DOE 14th Pollution Prevention Conference, Seattle, WA, June 1-4, 1998 (Invited).

Adams, V., M. Bennett, L. Bishop, K. Deacon, T. Mims, R. Sheely, K. L. Yuracko, P. Selby, G. Kerr, M. Gresalfi, C. Johnson, and C. Goddard, "U.S. Department of Energy National Center of Excellence for Metals Recycle," presented at Spectrum '98, International Conference on Nuclear and Hazardous Waste Management, Denver, CO, September 13-18, 1998 (Invited).

Allison, D. P., M. J. Doktycz, P. R. Hoyt, T. Thundat, P. I. Oden, and R. J. Warmack, "Investigating Molecular Interactions of Biological Nanoparticles by AFM," presented at the USDOE Workshop on Instrumentation and Measurement Issues for Nanometer Particles, University of Minnesota, Minnesota, MN, December 5-7, 1997 (Invited).

Allison, D. P., P. R. Hoyt, M. J. Doktycz, and R. J. Warmack, "Resolving Proteins Bound to Individual DNA Molecules by AFM," presented at the Scanning Microscopy Meeting, Chicago, IL, May 10-15, 1997 (Invited).

Allison, D. P., M. J. Doktycz, P. R. Hoyt, T. Thundat, and R. J. Warmack, "AFM Imaging Site-Specific Protein Binding to DNA Molecules," presented at the 9th International Conference on Scanning Tunneling Microscopy, Hamburg, Germany, July 20-25, 1997 .

Allison, D. P., R. J. Warmack, M. J. Doktycz, T. Thundat, and P. R. Hoyt, "Resolving Proteins Bound to Individual DNA Molecules," presented at STM-AFM-SNOM and Biological "Objects", Noisy le Grand, France, April 16-18, 1997 (Invited).

Allison, D. P., M. J. Doktycz, P. R. Hoyt, T. Thundat, and R. J. Warmack, "The Analysis of Genomes by AFM," presented at Scanning 97, Monterey, CA, April 19-22, 1997 (Invited).

Allison, D. P., "Applications of Scanning Probe Microscopes for Biological Research," presented at the Symposium on Frontiers of Microscopy, University of Memphis, Memphis, TN, April 23, 1998 (Invited).

Allison, D. P. and P. R. Hoyt, "Investigating Protein-DNA Interactions by AFM," presented at Partnering for Functional Genomics Research, Oak Ridge, TN, April 16-17, 1998 (Invited).

Arlinghaus, H. F., M. N. Kwoka, and K. B. Jacobson, "Detection of Unlabeled DNA on Peptide Nucleic Acid-Based Genosensor Chips," presented at the 9th International Genome Sequencing and Analysis Conference, Hilton Head, SC, September 13-16, 1997.

Barshick, S.-A., A. Vass, and D. Wolf, "Differentiation of Microorganisms Using Pyrolysis-Ion Trap Mass Spectrometry and Chemical Ionization," presented at the 46th American Society of Mass Spectrometry Conference on Mass Spectrometry and Allied Topics, Orlando, FL, May 31-June 4, 1998.

Beattie, K. L., H. Fredrickson, E. Perkins, K. Diedrich, M. J. Doktycz, J. T. Fleming, A. Nagel, and R. Tonucci, "Genosensor-Based Ecotoxicity Response Monitoring," presented at the Symposium on Partners in Environmental Technology, Washington, DC, December 1, 1998 (Invited).

Beatty, B. R., S. G. Shinpock, K. J. Houser, and M. J. Justice, "Artificial Insemination in the Mouse ," presented at the 25th Anniversary of "Frozen" Mice: Embryo and Gamete Cryopreservation, Bar Harbor, ME, September 23, 1997 (Invited).

Beets, A. L., S. Guhlke, S. Mirzadeh, H.-J. Biersack, and F. F. Knapp, Jr., "Use of 'Tandem' Cation/Anion Exchange Column System Provides High Specific Volume Tc-99m Solutions from Low Specific Activity (n,y) Mo-99," presented at the 45th Annual Meeting of the Society of Nuclear Medicine, Toronto, Canada, June 8, 1998.

Bergstrom, K. A., D. W. McPherson, C. Halldin, M. Greenbaum, J. Hiltunen, C.-G. Swahn, H. Ito, N. Ginovart, H. Hall, S. Larsson, P.-O. Schnell, F. F. Knapp, Jr., and L. Farde, "Metabolite Pattern of Radioiodinated E-(R,R)-IQNP in Rodent and Primate Plasma," presented at the 11th International Symposium on Radiopharmaceutical Chemistry, Uppsala, Sweden, June 15-19, 1997.

Bergstrom, K. A., C. Halldin, A. Savonen, Y. Okubo, J. Hiltunen, C.-G. Swahn, D. McPherson, F. F. Knapp, Jr., S. Larsson, P. O. Schnell, and L. Farde, "Iodine-123 Labelled Z-(R,R)-IQNP: A Potential Radioligand for Visualization of M2 Muscarinic Acetylcholine Receptors in Brain with SPET," presented at the Joint World Federation of Nuclear Medicine (WFNM&B) and European Association of Nuclear Medicine (EANM) Congress, Berlin, Germany, August 30, 1998.

Bergstrom, K. A., C. Halldin, A. Savonen, Y. Okubo, C.-G. Swahn, D. McPherson, F. F. Knapp, Jr., J. Hiltunen, S. Larsson, P. O. Schnell, and L. Fardel, "Iodine-123 Labelled Z-(R,R)-IQNP: A New Radioligand for Visualization of M2 Muscarinic Acetycholine Receptor in Brain," presented at the Joint World Federation of Nuclear Medicine and Biology-European Association of Nuclear Medicine Congress, Berlin, Germany, August 30, 1998.

Bililign, S., L. Liu, C. S. Feigerle, and J. C. Miller, "Metal-Ion Chemistry in Clusters Initiated by Ionization/Dissociation of Organometallic Precursors," presented at the Gordon Conference on Structures, Energetics and Dynamics of Gaseous Ions, Ventura, CA, February 23-27, 1997.

Bililign, S., L. Liu, C. S. Feigerle, and J. C. Miller, "Metal-Ion Chemistry in Clusters Initiated by Ionization/Dissociation of Organometallic Precursors," presented at the Annual Meeting of the Division of Atomic, Molecular and Optical Physics (DAMOP) of the American Physical Society, April 19, 1997.

Bililign, S., L. Liu, C. S. Feigerle, and J. C. Miller, "Metal-Ion Chemistry in Clusters Initiated by Ionization/Dissociation of Organometallic Precursors," presented at the 17th International Symposium on Molecular Beams, Paris, France, June 2, 1997 (Invited).

Bililign, S., C. S. Feigerle, and J. C. Miller, "Inverse Laser Ablation: Formation and Chemistry of Nanoparticles from Gaseous Precursors," presented at the 4th International Conference on Laser Ablation, Monterey, CA, July 21-25, 1997.

Bogard, J. S., "Performance Requirements for Pocket-Sized Alarm Dosimeters and Alarm Ratemeters - Status and Comparison with Related Standards," presented at the NIST/NRC Electronic Dosimetry Workshop, Gaithersburg, MD, October 14-16, 1997 (Invited).

Bogard, J. S., K. L. Yuracko, M. E. Murray, R. A. Lowden, and N. L. Vaughn, "Application of Life Cycle Analysis: The Case of Green Bullets," presented at the 14th U.S. DOE Pollution Prevention Conference, Seattle WA, June 1-4, 1998 (Invited).

Bogard, J. S., K. L. Yuracko, M. E. Murray, R. A. Lowden, and N. L. Vaughn, "Application of Life Cycle Analysis: The Case of Green Bullets," presented at Spectrum '98, International Conference on Nuclear and Hazardous Waste Management, Denver, CO, September 13-18, 1998 (Invited).

Boll, R. A., S. Mirzadeh, S. J. Kennel, D. W. Depaoli, and O. Webb, "Ac-225/Bi-213 Biomedical Generator," presented at the Winter Meeting of the American Nuclear Society, Albuquerque, NM, November 16-20, 1997.

Borges, H. T., J. Watkins, R. Stafford, P.-Y. Lu, R. Biggar, and J. Goedert, "Collection and Verification of Matched Data from Selected United States Cancer and HIV/AIDS Registries," presented at the National AIDS Meeting, Bethesda, MD, April 10, 1998.

Brandes, H. K., F. W. Larimer, and F. C. Hartman, "Mutagenesis of Tryptophanyl Residues of Spinach Phosphoribulokinase (PRK)," presented at the 17th International Congress of Biochemistry and Molecular Biology, San Francisco, CA, August 24,1997.

Britton, C. L., W. L. Bryan, S. F. Smith, R. J. Warmack, P. I. Oden, T. G. Thundat, R. L. Jones, and J. M. Rochelle, "MEMS Sensor Arrays for Low-Concentration Chemical and Biological Sensing (Nose-On-A-Chip)," presented at United Technologies Corporation, East Hartford, CT, July 7,1998.

Brown, A.-D., T. G. Thundat, and M. S. Smith, "Detection of Charged Particles Using Microcantilevers," presented at the 45th International Symposium of the American Vacumn Society, Baltimore, MD, November 2-6,1998.

Buchanan, M. V., G. B. Hurst, M. J. Doktycz, P. F. Britt, K. Weaver, M. Lidstrom, and A. Costello, "Monitoring Genetic and Metabolic Potential for In Situ Bioremediation: Mass Spectrometry," presented at the Environmental Management Science Program Workshop, Chicago, IL, July 27-30, 1998 (Invited).

Buncick, M. S., P. I. Oden, F. Meriaudeau, J. DePriest, and T. L. Ferrell, "Detection of Hydrogen by Surface Plasmon Resonance ," presented at the Meeting of the American Vacumn Society, Baltimore, MD, November 2-6, 1998.

Chen, C. H., N. I. Taranenko, Y. F. Zhu, C. N. Chung, and S. L. Allman, "Laser Mass Spectrometry for DNA Sequencing, Disease Diagnosis, and Fingerprinting," presented at the Society of Photo-Optical Instrumentation Engineering Conference on Advances in Nucleic Acids Monitoring, Manipulation and Sequencing Technologies, San Jose, CA, February 8, 1997.

Chen, C. H., N. I. Taranenko, Y. F. Zhu, C. N. Chung, S. L. Allman, I. Narayan, and K. J. Matteson, "Various Approaches for Sequencing Single-Stranded and Double-Stranded DNA by MALDI," presented at the 45th American Society of Mass Spectrometry Conference on Mass Spectrometry and Related Topics, Palm Springs, CA, June 1-5, 1997 (Invited).

Chen, C. H., V. V. Golovlev, W. R. Garrett, R. V. Goedert, T. A. Whittaker, and D. W. Templeton, "Optical Power Limiting for Eye Protection from Tunable Lasers," presented at the Society of Photo-Optical Instrumentation Engineering and Optical Science, Engineering, and Instrumentation Conference on Nonlinear Optical Liquids and Power Limiters, San Diego, CA, July 27-August 1, 1997 (Invited).

Chen, C. H., N. I. Taranenko, V. V. Golovlev, N. R. Isola, S. L. Allman, L. Y. Chang, K. J. Matteson, and N. T. Potter, "MALDI for DNA Sequencing, Disease Diagnosis and Forensic Applications," presented at the 46th American Society of Mass Spectrometry Conference on Mass Spectrometry and Allied Topics, Orlando, FL, May 30, 1998.

Collins, E. D., S. Mirzadeh, and F. F. Knapp, Jr., "Development of a Modular Concentrator for Improved Medical Application of Technetium-99M," presented at The Impact of Emerging Technology on Health, Knoxville, TN, December 3-4, 1998.

Cosman, M., R. Xu, B. E. Hingerty, S. Amin, N. E. Geacintov, S. Broyde, and D. J. Partel, "Comparison of the Solution Structures of (+)-and(-)-trans-anti-methylchrysene-DNA Duplex Adducts," presented at the American Association for Cancer Research (AACR) Meeting, San Diego, CA, April 12-16, 1997 (Invited).

Crawford, O. H., "A Bayesian Threading Algorithm for Protein Fold Recognition," presented at the 17th International Congress of Biochemistry and Molecular Biology, San Francisco, CA, August 24-29, 1997 (Invited).

Crawford, O. H., "A New Threading Algorithm for Protein Fold Recognition," presented at the 2nd International Conference on Computational Molecular Biology, RECOMB '98, New York, NY, March 22, 1998.

Crawford, O. H., "A New Tool for Protein Fold Recognition: A Bayesian Heuristic Threading Algorithm," presented at the 2nd Annual International Conference on Computational Molecular Biology, New York, NY, March 22, 1998.

Crawford, O. H., Y. Xu, D. Xu, and E. C. Uberbacher, "A New Threading Algorithm for Proteins," presented at the 3rd Community Wide Experiment on the Critical Assessment of Techniques for Protein Structure Prediction, Asilomar, CA, December 13, 1998.

Crilly, P. B., W. B. Dress, D. L. Hedden, and T. L. Ferrell, "Analysis of Pulse Oximetry Data Using the Wavelet Transform," presented at the Instrumentation and Measurement Technology Conference, IMTC '98, St. Paul, MN, May 18-20, 1998.

Datskou, I. C. and C. L. Arquiett, "Effects of Funding Delays on Environmental Problems," presented at the Annual Meeting of the Society of Risk Analysis, Washington, DC, December 7-10, 1997.

Davis, I. A. and S. J. Kennel, "Radioimmunotherapy Using Vascular Targeted ^{213}Bi: The Role of TNF-Alpha in the Development of Pulmonary Fibrosis," presented at the 7th Conference on Radioimmunodetection and Radioimmunotherapy of Cancer, Princeton, NJ, October 14-18, 1998.

DePaoli, D. W., O. F. Webb, S. S. Laughlin, and R. A. M. Boll, S., "Separation/Purification of Thorium-229 for Medical Applications," presented at the 10th Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, TN, October 20, 1997.

Dichtl, B., A. Stevens, and D. Tollervey, "Lithium Toxicity in Yeast is Due to the Inhibition of RNA Processing Enzymes," presented at the 2nd Annual Meeting of RNA Society, RNA '97, Banff, Alberta, Canada, May 27, 1997.

Ding, W. X., D. L. McCorkle, and L. A. Pinnaduwage, "Enhanced Radical Formation by Electron Attachment to Highly-Excited States of Molecules in Plasmas," presented at the 25th IEEE International Conference on Plasma Science, Raleigh, NC, June 1-4, 1998.

Ding, W. X., D. L. McCorkle, C. Y. Ma, and L. A. Pinnaduwage, "Decomposition of Volatile Organic Compounds in a Positive Column Glow Discharge Plasma," presented at the 25th IEEE Interenational Conference on Plasma Science, Raleigh, NC, June 1-4, 1998.

Doktycz, M. J. and K. L. Beattie, "The Flowthrough Genosensor Program at Oak Ridge National Laboratory," presented at Biomarkers, The Genome and the Individual, Charleston, SC, May 4-8, 1997.

Downey, T., F. Meriaudeau, A. Passian, A. Wig, P. Crilly, T. L. Ferrell, and T. L. Ferrell, "Development of a Fiber Optics Sensor Based on Gold Island Plasmon Resonance," presented at the International Conference on Applications of Photonic Technology, Ottawa, Canada, July 27-30, 1998.

Efroymson, R. A., B. E. Sample, C. T. Hunsaker, B. Lyon, A. Simcock, and G. W. Suter, "A Dynamical Model for Terrestrial Ecological Exposure to Toxic Air Pollutants," presented at the Meeting of the Society for Environmental Toxicological Chemistry, San Francisco, CA, November 16-20, 1997 (Invited).

Efroymson, R. A., B. E. Sample, C. T. Hunsaker, B. Lyon, A. Simcock, and G. W. Suter, II, "A Dynamic Model for Terrestrial Ecological Exposure to Toxic Air Pollutants," presented at the Meeting of the Society for Risk Analysis, Washington, DC, December 7-10, 1997 (Invited).

Egidi, P. V., "Introduction to Naturally Occurring Radioactive Material," presented at the 42nd Annual Meeting of the Health Physics Society, San Antonio, TX, June 30, 1997 (Invited).

Egidi, P. V., "The Independent Verification Process in Decommissioning, Decontamination, and Reutilization Activities - Description, Benefits, and Lessons Learned," presented at the Meeting of the American Nuclear Society on Decommissioning, Decontamination and Reutilization, Knoxville, TN, September 7-12, 1997.

Egidi, P. V., C. R. Flynn, M. S. Blair, and R. J. Selfridge, "Real-Time, Automated Characterization of Surfaces for Alpha and Beta Radiation," presented at X-Change '97, Hemispheric Center for Environmental Technology, Miami, FL, December 1-5, 1997.

Eigler, N., J. Whiting, A. Chernomorsky, J. Jackson, F. F. Knapp, Jr., and F. Litvack, "Radiant™ Liquid Radioisotope Intravascular Radiation Therapy System," presented at the 2nd Annual Symposium on Radiotherapy to Reduce Restenosis, LaJolla, CA, January 16, 1998.

England, C. A. and J. E. Turner, "Statistical Analysis of a Radiological Site Characterization Plan," presented at the Annual Meeting of the Health Physics Society, San Antonio, TX, June 29-July 3, 1997.

Ericson, M. N., D. K. Johnson, R. S. Burlage, T. L. Ferrell, D. E. McMillan, K. G. Falter, A. D. McMillan, S. F. Smith, G. E. Jellison, and C. L. Britton, Jr., "A Subdermal Physiological Monitoring System for Mass Screening Mice in Gene Expression Studies," presented at the 6th DOE Contractor and Grantee Workshop of the Human Genome Program, Santa Fe, NM, November 9-13, 1997 (Invited).

Evans, B. R., J. Zhou, T. L. Poole, G. J. Bunick, A. V. Palumbo, and J. Woodward, "Extremozymes for Bioprocessing," presented at the Fall Meeting of the American Chemical Society, Boston, MA, August 23-27, 1998 (Invited).

Feigerle, C. S., S. Bililign, and J. C. Miller, "Chemistry in Metal Microclusters," presented at the Symposium on Laser-Induced Chemstry in Clusters, XIII Interdisciplinary Science Conference, Long Beach, CA, October 12-17, 1997 (Invited).

Feigerle, C. S. and J. C. Miller, "Nanochemistry: Chemical Reactions Within Clusters," presented at Instrumentation and Measurement Issues for Nanometer Particles, Minneapolis, MN, December 5-7, 1997 (Invited).

Ferrell, T. L., P. B. Crilly, S. F. Smith, A. L. Wintenberg, C. L. Britton, G. W. Morrison, M. N. Ericson, D. L. Hedden, and D. Bouldin, "Medical Telesensors," presented at the International Biomedical Optics Symposium, BiOS '98, San Jose, CA, January 24-30, 1998.

Foltz, C. J., K. C. Goss, D. K. Johnson, and J. C. Schryver, "Behavioral and Functional Analysis of the Laboratory Mouse," presented at the 49th National Meeting of American Association for Laboratory Animal Science (AALAS), Cincinnati, OH, October 18,1998.

Forbes, G. H., "Independent Verification Process for Environmental Restoration Program Activities," presented at the Topical Meeting of the American Nuclear Society, Knoxville, TN, September 7-12, 1997.

Forbes, G. H., "Independent Verification Process for Environmental Restoration Program Activities," presented at the 8th Annual West Coast Conference on Contaminated Soils and Groundwater, Oxnard, CA, March 9-12, 1998 (Invited).

Geck, M. K. and F. C. Hartman, "Interactions of Chloroplastic Thioredoxins with Target Enzymes," presented at the Joint Meeting of the American Society of Plant Physiology/Canadian Society of Plant Physiology, Vancouver, British Columbia, Canada, April 2-6, 1997.

Gledd, L. N., H. Amols, C. Marboe, F. F. Knapp, Jr., and J. Weinberger, "Effectiveness of a Beta-Emitting Liquid-Filled Perfusion Balloon to Prevent Restenosis," presented at the Annual Meeting of American Heart Association, Orlando, FL, November 9-12, 1997.

Goss, K. C., J. C. Schryver, and D. K. Johnson, "Behavioral Testing Results for the p^{30Pub} Mutants at ORNL," presented at the 7th International Behavioral Neuroscience Society Conference, Richmond, VA, June 11-14, 1998.

Goss, K. C., D. K. Johnson, and J. C. Schryver, "Behavior Testing in the 30Pub Deletion Mutation: An Animal Model for Angelman Syndrome," presented at the 49th National Meeting of American Association for Laboratory Animal Science (AALAS), Cincinnati, OH, October 18, 1998.

Goss, K. C., K. Mattson, and R. Mervis, "Enriched Motor Learning Enhances Neuroplasticity in the Lurcher Mouse," presented at the 49th National Meeting of American Association for Laboratory Animal Science (AALAS), Cincinnati, OH, October 18,1998.

Gu, Z., A. Gorin, B. Mao, B. E. Hingerty, S. Broyde, and D. J. Patel, "Solution Structure of a Template-Primer Model Containing an AF Modified G Opposite C or A at the Junction," presented at Supercomputing '98, Orlando, FL, November 7-13, 1998.

Gunter, L. E., G. T. Roberts, K. Lee, F. W. Larimer, and G. A. Tuskan, "RAPD and SCAR Markers Linked to Femaleness in Salix viminalis L.," presented at the 6th Conference on Plant and Animal Genome, San Diego, CA, January 18-22, 1998.

Gunter, L. E., G. T. Roberts, K. L. Lee, G. A. Tuskan, and F. W. Larimer, "RAPD and SCAR Markers Linked to Femaleness in Salix viminalis L.," presented at Frontiers of Forest Biology 1998, Joint Annual Meeting of North American Forest Biology and WFGA, University of Victoria, Victoria, British Columbia, Canada, June 21-26, 1998.

Harp, J. M., D. E. Timm, and G. J. Bunick, "Protein Crystal Annealing: Overcoming Increased Mosaicity Associated with Cryocrystallography," presented at the Annual Meeting of American Crystallographic Association, St. Louis, MO, July 19-25, 1997.

Harpel, M. R., F. W. Larimer, and F. C. Hartman, "Covalent Chemical Rescue of Rhodospirillum robrum Ribulose 1,5-Bisphosphate Carboxylase/Oxygenase (Rubisco) Mutants," presented at the 17th International Congress of Biochemistry and Molecular Biology, San Francisco, CA, August 24, 1997.

Hartman, F. C., Y.-R. Chen, T.-Y. S. Lu, and F. W. Larimer, "Characterization of Recombinant Spinach Ribulose-5-Phosphate 3-Epimerase (Ru5P Epimerase)," presented at the 12th Symposium of the Protein Society, San Diego, CA, July 25-29, 1998.

Hettich, R. L., A. Lahamer, and R. Compton, "Characterization of the Fragmentation and Reactivity of Endohedral Fullerenes with FTICR," presented at the 46th American Society of Mass Spectrometry Conference on Mass Spectrometry and Allied Topics, Orlando, FL, May 31-June 4, 1998.

Hingerty, B. E., S. B. Singh, and S. Broyde, "DNA - The Molecule, State of the Art," presented at the Meeting of the American Chemical Society, Symposium on DNA - The Molecule, State of the Art, Dallas, TX, March 30,1998.

Hoyt, P. R., D. P. Allison, M. J. Doktycz, and R. J. Warmack, "Resolving Proteins Bound to Individual DNA Molecules by Atomic Force Microscopy," presented at Biomarkers, The Genome and the Individual, Charleston, SC, May 4-8, 1997.

Hu, Z., P. I. Oden, T. Thundat, and R. J. Warmack, "Real-Time Mercury and Hydrogen Vapor Detection Using Microcantilever Sensors," presented at the March Meeting of the American Physics Society, Los Angeles, CA, March 16-20, 1998.

Hurst, G. B., K. Weaver, M. Doktycz, and M. V. Buchanan, "Analysis of PCR Products Using Delayed-Extraction MALDI-TOF," presented at the 45th American Society of Mass Spectrometry Conference on Mass Spectrometry and Allied Topics, Palm Springs, CA, June 1-5, 1997 (Invited).

Hurst, G. B., K. Weaver, M. J. Doktycz, M. V. Buchanan, A. M. Costello, and M. E. Lidstrom, "TOF-MS Detection of PCR Products," presented at the 10th Sanibel Conference on Mass Spectrometry, Sanibel Island, FL, American Society of Mass Spectrometry, January 24-27, 1998.

Hurst, G. B., K. Weaver, M. Doktycz, M. V. Buchanan, A. M. Costello, and M. E. Lidstrom, "Identification of Methanotrophic Bacteria Using the Polymerase Chain Reaction with MALDI-TOF Detection," presented at the 46th American Society of Mass Spectrometry Conference on Mass Spectrometry and Allied Topics, Orlando, FL, May 31-June 4, 1998.

Jacobson, K. B., L. J. Stubbs, D. P. Allison, R. P. Woychik, M. J. Justice, D. K. Johnson, E. C. Uberbacher, J. M. Ramsey, K. L. Beattie, and T. Vo-Dinh, "The Mouse/Human Genome Program at the Oak Ridge National Laboratory," presented at the Human Genome and Gene Theory Symposium, Seoul, South Korea, May 28, 1997 (Invited).

Jacobson, K. B., L. J. Stubbs, D. P. Allison, R. P. Woychik, M. J. Justice, D. K. Johnson, E. C. Uberbacher, J. M. Ramsey, K. L. Beattie, and T. Vo-Dinh, "The Mouse/Human Genome Program at the Oak Ridge National Laboratory," presented at the 3rd International Engelhardt Symposium on Molecular Biology, Moscow, Russia, June 9, 1997 (Invited).

Ji, Y., M. J. Walkowicz, E. M. Rinchik, J. M. Amos-Landgraf, R. E. Tarvin, K. Buiting, B. Horsthemke, D. K. Johnson, L. Stubbs, and R. D. Nicholls, "The Ancestral Gene for the Prader-Willi and Angelman Syndrome END Repeat Element Encodes a Giant Protein and Causes the jdf2 Syndrome in Mouse," presented at the International Chromosome 15 Workshop (SCW15), Baltimore, MD, October 28, 1997 (Invited).

Johnson, D. K., M. J. Justice, K. L. Beattie, M. V. Buchanan, M. Ramsey, L. R. Ramsey, M. J. Paulus, M. N. Ericson, D. P. Allison, D. L. Kress, R. J. Mural, E. C. Uberbacher, and R. C. Mann, "The Functional Genomics Initiative at Oak Ridge National Laboratory," presented at the 6th DOE Contractor and Grantee Workshop, Santa Fe, NM, November 9-13, 1997 (Invited).

Johnson, D. K., "Mouse Genetics and Mutagenesis at ORNL ," presented at the Partnering for Functional Genomics Workshop, ORNL, Oak Ridge, TN, April 16, 1998 (Invited).

Jung, C.-H., T.-Y. S. Lu, and F. W. Larimer, "Heterologous Expression and Characterization of Ribose-5-Phosphate Isomerase from Spinach," presented at the Annual Meeting of the American Society of Biochemical Molecular Biology, Washington, DC, May 16-20, 1998.

Justice, M. J. and D. A. Carpenter, "Generating Allelic Series at 'Beige' and 'Satin' by ENU Mutagenesis," presented at the 11th International Mouse Genome Conference, St. Petersburg, FL, October 12, 1997 (Invited).

Justice, M. J., G. M. Hansen, B. Sheppard, and T. Shountz, "Using Retroviral Tags to Identify Cancer Susceptibility Genes in Mouse AKXD B-Cell Lymphomas," presented at the 11th International Mouse Genome Conf., St. Petersburg, FL, October 16, 1997 (Invited).

Katkov, I. I. and P. Mazur, "Influence of Centrifugation on Motility, Yield, and Cell Associations of Mouse Spermatozoa," presented at the 34th Annual Meeting of the Society of Cryobiology, Barcelona, Spain, June 8, 1997 (Invited).

Katkov, I. I. and P. Mazur, "Factors Affecting Yield and Survival of Cells When Suspensions Are Subjected to Centrifugation," presented at the 34th Annual Meeting of the Society of Cryobiology, Barcelona, Spain, June 8, 1997 (Invited).

Kerr, G. D., "A Review of Biologically and Physically Related Dosimetric Data for Hiroshima," presented at the 43rd Annual Meeting of the Health Physics Society, Minneapolis, MN, July 12-16, 1998.

Kerr, G. D., "Chromosome Aberrations and Neutron Doses at Hiroshima," presented at the 47th Annual Scientific Meeting of the Radiation Research Society, Louisville, KY, April 25-29, 1998.

Knapp, F. F., Jr., A. L. Beets, S. Mirzadeh, and S. Guhlke, "Use of a New Tandem Cation/Anion Exchange System with Clinical-Scale Generators Provides High Specific Volume Solutions of Technetium-99m and Rhenium-188," presented at International Trends in Radiopharmaceuticals Diagnosis and Therapy, Lisbon, Portugal, March 30-April 3, 1997.

Knapp, F. F., Jr., "Coronary Irradiation with Beta-Emitting Radioisotopes to Inhibit Restenosis After PTCA - An Old Therapy for a New Problem," presented at the Symposium on Accelerating Nuclear Medicine, Richland, WA, April 19-24, 1997 (Invited).

Knapp, F. F., Jr. and the Nuclear Medicine Group, "Therapeutic Clinical Applications of Reactor-Produced Radioisotopes," presented at the American Nuclear Society Symposium on Isotope Production and Applications, Albuquerque, NM, November 16-20, 1997 (Invited).

Knapp, F. F., Jr., "The Development and Use of Radionuclide Generators in Nuclear Medicine - Recent Advances and Future Perspectives," presented at the International Symposium on Modern Trends in Radiopharmaceuticals for Diagnosis and Therapy, Lisbon, Portugal, March 30-April 3, 1998 (Invited).

Knapp, F. F., Jr., "Overview of the Production of Therapeutic Medical Radioisotopes in the ORNL HFIR for Applications in Oncology, Nuclear Medicine and Interventional Cardiology," presented to the Department of Nuclear Medicine, University Hospital, Vienna, Austria, April 6, 1998 (Invited).

Knapp, F. F., Jr., "Overview of the Production of Therapeutic Medical Radioisotopes in the ORNL HFIR for Applications in Oncology, Nuclear Medicine and Interventional Cardiology," presented at the Hungarian Academy of Sciences, in conjunction with Department of Nuclear Medicine, Albert Svent Georgi Medical University, Szeged, Hungary, April 9,1998 (Invited).

Knapp, F. F., Jr., A. L. Beets, S. Mirzadeh, C. W. Alexander, and R. L. Hobbs, "Production of Medical Radioisotopes in the ORNL High Flux Isotope Reactor (HFIR) for Cancer Treatment and Arterial Restenosis Therapy After PTCA," presented at the 13th Radiochemical Conference, Marianzke Lazne, Czech Republic, April 19-24, 1998 (Invited).

Knapp, F. F., Jr., "Radioisotopes for Cancer Therapy - The Importance and Availability of Reactor-Produced Radioisotopes ," presented at the 8th Mediterranean Meeting on Nuclear Medicine and Radiopharmaceuticals for Oncology, Rome, Italy, May 19-24,1998.

Knapp, F. F., Jr., A. L. Beets, S. Guhlke, H.-J. Biersack, K. N. Gledd, C. Marboe, H. Amols, and J. Weinberger, "Rhenium-188 Liquid-Filled Balloons Effectively Inhibit Restenosis in a Swine Coronary Overstretch Model - A Simple New Method Bridging Nuclear Medicine and Interventional Cardiology," presented at the 45th Annual Meeting of the Society of Nuclear Medicine, Toronto, Canada, June 8, 1998.

Knapp, F. F., Jr., "Reactor-Produced Radioisotopes for Therapeutic Applications," presented at Mallinckrodt Medical, Inc., St. Louis, MO, August 11, 1998 (Invited).

Knapp, F. F., Jr., "Development and Use of the ORNL Alumina-Base Tungsten-188/Rhenium-188 Generator System," presented at Mallinckrodt Medical, Inc., St. Louis, MO, August 11, 1998 (Invited).

Knapp, F. F., Jr., A. L. Beets, S. Guhlke, H.-J. Biersack, M. Stabin, and R. E. Spencer, "Liquid-Filled Balloons for Coronary Restenosis Therapy - Strategy and Dosimetry for Use of Rhenium-188," presented at the Joint World Federation of Nuclear Medicine (WFNM&B) and European Assoc. of Nuclear Medicine (EANM), Berlin, Germany, August 30, 1998.

Knapp, F. F., Jr., "Production of Therapeutic Radioisotopes," presented at the Pre-Congress Symposium on New Strategies for Radioimmunotherapy and Radioreceptortherapy, Berlin, Germany, August 31, 1998 (Invited).

Knapp, F. F., Jr., "Opening Remarks and Introduction of the Symposium," presented at the Symposium on Radiopharmaceuticals and Radiopharmacy, Berlin, Germany, September 2, 1998 (Invited).

Knapp, F. F., Jr. and J. H. Kropp, "Opening Remarks," presented at the Symposium on Radioiodinated Free Fatty Acids, Dresden, Germany, September 6, 1998 (Invited).

Kocher, D. C., "NCRP Recommendations on Risk-Based Classification for Radioactive and Hazardous Chemical Wastes," presented at the meeting of East Tennessee Chapter of Health Physics Society, Oak Ridge, TN, January 21, 1997 (Invited).

Kocher, D. C., "Dose Coefficients for Internal and External Exposure," presented at Radiological Assessments Corporation short course on *Calculating and Understanding Risk from Radionuclides Released to the Environment*, Santa Fe, NM, April 30, 1997 (Invited).

Kocher, D. C., "Regulations for Radionuclides and Hazardous Chemicals in the Environment," presented at Radiological Assessments Corporation short course on *Calculating and Understanding Risk from Radionuclides Released to the Environment*, Santa Fe, NM, April 30, 1997 (Invited).

Kocher, D. C., "Context for Performance Assessment," presented at the DOE Low-Level Waste Management Conference, Salt Lake City, UT, May 20-22, 1997 (Invited).

Kocher, D. C., "Sources, Classification, and Disposal of Radioactive Wastes—History and Legal and Regulatory Requirements," presented at Harvard School of Public Health short course on *Management and Disposal of Radioactive Wastes*, Boston, MA, June 16, 1997 (Invited).

Kocher, D. C., "Classification and Disposal of Radioactive Wastes—History and Legal and Regulatory Requirements," presented at Professional Enrichment Program of Health Physics Society, San Antonio, TX, June 29, 1997 (Invited).

Kocher, D. C., "NCRP Study on Risk-Based Classification for Radioactive and Hazardous Chemical Wastes," presented at National Research Council Board on Radioactive Waste Management meeting on New Developments in Low-Level/Low-Activity Waste Management and Disposal, Washington, DC, July 17, 1997 (Invited).

Kocher, D. C., "Review of Standards for Limitation of Radiation Dose to Radiation Workers and Members of the Public and Laws and Regulations and Hazardous Chemicals in the Workplace and the Environment," presented at The University of Tennessee, Department of Nuclear Engineering short course on *Radiological Assessment*, Knoxville, TN, August 18, 1997 (Invited).

Kocher, D. C., "Review of Standards for Limitation of Radiation Dose to Radiation Workers and Members of the Public and Laws and Regulations and Hazardous Chemicals in the Workplace and the Environment," presented at Colorado State University, Department of Radiological Health Sciences course on *Radiation Public Health*, Fort Collins, CO, March 5, 1998 (Invited).

Kocher, D. C., "Disposal of Radioactive Wastes—Review of Legal and Regulatory Requirements," presented at Colorado State University, Department of Radiological Health Sciences course on *Radiation Public Health*, Fort Collins, CO, March 6, 1998 (Invited).

Kocher, D. C., "Regulation of Public Exposures to Radionuclides and Hazardous Chemicals: Seeking Common Ground," presented at Rutgers University, Environmental and Occupational Health Sciences Institute, Piscataway, NJ, May 6, 1998 (Invited).

Kocher, D. C., "Sources, Classifications, and Disposal of Radioactive Wastes—History and Legal and Regulatory Requirements," presented at Harvard School of Public Health short course on *Management and Disposal of Radioactive Wastes*, Boston, MA, June 15, 1998 (Invited).

Kocher, D. C., "Classification and Disposal of Radioactive Wastes—History and Legal and Regulatory Requirements," presented at Professional Enrichment Program of Health Physics Society, Minneapolis, MN, July 12, 1998 (Invited).

Kocher, D. C., "Current Approaches to Regulating Public Exposures to Radionuclides and Hazardous Chemicals," presented at Professional Enrichment Program of Health Physics Society, Minneapolis, MN, July 14, 1998 (Invited).

Kocher, D. C., "U.S. Regulatory Approaches to Residual Radioactive Material," presented at the International Conference on Topical Issues in Nuclear, Radiation, and Radioactive Waste Safety, Vienna, Austria, International Atomic Energy Agency, August 31-September 4, 1998 (Invited).

Kocher, D. C., "Classification and Disposal of Radioactive Wastes—History and Legal and Regulatory Requirements," presented at Moeller and Associates short course on *Management and Disposal of Radioactive Wastes*, Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID, September 21, 1998 (Invited).

Kocher, D. C., "Assessment of Radiation Doses from Consumer Products," presented at Department of Physics, Idaho State University, Pocatello, ID, October 5, 1998 (Invited).

Kocher, D. C., "Regulations for Management and Disposal of Radioactive Wastes," presented at Idaho State University, Department of Physics course on *Radiation Regulations*, Pocatello, ID, October 6, 1998 (Invited).

Kocher, D. C., "Classification and Disposal of Radioactive Wastes—History and Legal and Regulatory Requirements," presented at Moeller and Associates short course on *Management and Disposal of Radioactive Wastes*, U.S. Department of Energy Oak Ridge Operations, December 7, 1998 (Invited).

Kocher, D. C., G. D. Kerr, J. S. Bogard, P. A. Scofield, F. R. O'DOnnell, S. J. Cotter, and C. R. Mattsen, "Systematic Assessment of Exemptions for Source and Byproduct Materials," presented at the Annual Meeting of the Health Physics Society, Minneapolis, MN, July 12-16, 1998.

Kocher, D. C. and K. F. Eckerman, "On the Use of Age-Specific Effective Dose Coefficients in Radiation Protection of the Public," presented at the International Confernce on Topical Issues in Nuclear, Radiation, and Radioactive Waste Safety, Vienna, Austria, International Atomic Energy Agency, August 31-September 4, 1998.

Kotzerke, J., M. Rentschler, G. Glatting, E. Schneider, F. F. Knapp, Jr., and S. N. Reske, "Radiation Dose Measurements of a Balloon Catheter Filled with Liquid RE-188 by Means of a TLD-System," presented at the 45th Annual Meeting of the Society of Nuclear Medicine, Toronto, Canada, June 8, 1998.

Kotzerke, J., S. Fenchel, A. Guhlmann, M. Stabin, F. F. Knapp, Jr., and S. N. Reske, "Pharmacokinetics of TC-99M-Pertechnetate and RE-188-Perrhenate After Oral Application of Perchlorate - Significant Radiation

Reduction Achievable," presented at the 45th Annual Meeting of the Society of Nuclear Medicine, Toronto, Canada, June 8, 1998.

Kressin, M. D., P. D. Schreuders, and P. Mazur, "Effects on Motility and Aster Formation of Mouse Spermatozoa from a Reduction in Oxygen Concentration by Oxyrase™, an E. Coli Membrane Preparation," presented at the 34th Annual Meeting of the Society of Cryobiology, Barcelona, Spain, June 8, 1997 (Invited).

Larimer, F. W., C.-H. Jung, Y.-R. Chen, and F. C. Hartman, "Heterologous Overexpression of Pentose-5-Phosphate Isomerase and Pentose-5-Phosphate 3-Epimerase from Methanococcus jannashii," presented at the Conference on Microbial Genomes, Hilton Head, SC, January 31-February 3, 1998.

Larimer, F., R. Mural, M. Shah, A. Subramanian, and E. Uberbacher, "Microbial GRAIL Gene-Finding Systems," presented at the ASM (American Society of Microbiology) Conference on Small Genomes, Arrowhead, CA, September 20, 1998.

Li, A. N., B. E. Zimmerman, F. F. Knapp, H. I. Amols, and J. S. Whiting, "Reconciliation of Directly Measured Re-188 Balloon Dosimetry with Calculations Based on a New NIST Activity Calibration," presented at the 2nd Annual Symposium on Radiotherapy to Reduce Restenosis, LaJolla, CA, January 16, 1998.

Lowndes, D. H., C. M. Rouleau, T. Thundat, G. Duscher, E. A. Kenik, and S. J. Pennycook, "Silicon and Zinc Telluride Nanoparticles Synthesized by Pulsed Laser Ablation: Size Distributions and Nanoscale Structure," presented at the 4th International Conference on Laser Ablation (COLA '97), Monterey, CA, July 21-25, 1997.

Lowndes, D. H., C. M. Rouleau, T. Thundat, and E. A. Kenik, "Silicon Nanoparticles Synthesized by Pulsed Laser Ablation into Helium: Formation Mechanism and Characterization," presented at the 4th International Conference on Laser Ablation (COLA '97), Monterey, CA, July 21-25, 1997.

Lowndes, D. H., V. I. Merkulov, A. A. Puretzky, D. B. Geohegan, G. E. Jellison, Jr., C. M. Rouleau, and T. Thundat, "Amorphous Diamond Films Deposited by Pulsed-Laser Ablation: The Optimum Carbon-Ion Kinetic Energy and Effects of Laser Wavelength," presented at the Spring Meeting of the Material Research Society, Symposium Y: Advances in Laser Ablation of Materials, San Francisco, CA, April 13-17, 1998.

Luo, H., A. L. Beets, M. J. McAllister, M. Greenbaum, D. W. McPherson, and F. F. Knapp, Jr., "Resolution, In Vitro and In Vivo Evaluation of Fluorine-18-Labeled Isomers of 1-Azabicyclo[2.2.2]oct-3-yl Alpha-(1-Fluoropent-5-yl)-Alpha-Hydroxy-Alpha-Phenylacetate (FQNPe) as New PET Candidates for the Imaging of Muscarinic-Cholinergic Receptor," presented at China Institute of Atomic Energy, Beijing, China, December 29, 1997 (Invited).

Luo, H., A. L. Beets, and F. F. Knapp, Jr. , "A New Derivatized Aza-Thio (N3S4) Crown Ether Ligand for Bifunctional Chelate Labeling of Therapeutic Agents with Silver-111," presented at the 45th Annual Meeting of the Society of Nuclear Medicine, Toronto, Canada, June 8, 1998.

Lyon, B. F., G. Rice, and R. Ambrose, "The Utility of a Screening Model for Predicting Environmental Concentrations," presented at the Conference on Issues and Applications in Toxicology and Risk Assessment, Wright Patterson Air Force Base, OH, April 9, 1997 (Invited).

Ma, C.-Y., D. McCorkle, W. Ding, and L. Pinnaduwage, "Methodology for Direct Sampling of Volatile Organic Compounds Emerging from a Low Pressure, Flow-Through Reaction Cell for Subsequent GC/MS Analysis," presented at the 46th American Society of Mass Spectrometry Conference on Mass Spectrometry and Allied Topics, Orlando, FL, June 5, 1998.

Manges, W. W., S. F. Smith, C. L. Britton, W. L. Bryan, K. J. Scott, K. B. Jacobson, P. I. Oden, T. G. Thundat, R. J. Warmack, L. N. Howell, Jr., R. P. Hosker, Jr., and D. L. Auble, "A New Microtelesensor Chip for Meteorology," presenteed at the Atmospheric Research Management Science Team Meeting, San Antonio, TX, March 4-7,1997.

Mann, R. C., "Functional Genomics at Oak Ridge National Laboratory," presented at the Conference on Functional Genomics, Waltham, MA, November 16-17, 1998 (Invited).

Mao, B., B. E. Hingerty, S. Broyde, and D. J. Patel, "Slow Interconversion Between SYN 2-Aminofluorene (AF)-Intercalated and ANTI External Conformers in the NARI Mutation Hotspot Sequence Context," presented at the Workshop on Quantitative Modeling Approaches for Understanding and Predicting Mutagenicity and Carcinogenicity, Rome, Italy, September 3-5, 1997 (Invited).

Mazur, P., "Biophysical and Biological Factors Determining the Ability to Achieve Long-Term Cryobiological Preservation," presented at the BESTCapsule 2001 Workshop, Osaka, Japan, November 2-6, 1997 (Invited).

McPherson, D. W., W. K. Breeden, III, H. Luo, A. L. Beets, and F. F. Knapp, Jr., "Resolution, Radiolabeling, and In Vivo Evaluation of the Isomers of IPIP. An Attractive Ligand for Imaging mAChR," presented at the 45th Annual Meeting of the Society of Nuclear Medicine, Toronto, Canada, June 8, 1998.

McPherson, D. W., H. Luo, J. Kropp, and F. F. Knapp, Jr., "Synthesis and Radioiodination of 1,2-Dipal-3-Ippa via a Tributyltin Intermediate," presented at the 45th Annual Meeting of the Society of Nuclear Medicine, Toronto, Canada, June 8, 1998.

McPherson, D. W., H. Luo, J. Kropp, and F. F. Knapp, Jr., "Improved Radioiodination of 1,2-Dipalmitoyl-3-IPPA via a Tributyltin Intermediate," presented at the Joint World Federation of Nuclear Medicine (WFNM&B) and European Association of Nuclear Medicine (EANM) Congress, Berlin, Germany, August 30, 1998.

McPherson, D. W., H. Luo, A. L. Beets, and F. F. Knapp, Jr., "A Novel In Vivo Method for the Determination of Muscarinic Ligand Subtype Selectivity," presented at the Joint World Federation of Nuclear Medicine (WFNM&B) and European Association of Nuclear Medicine (EANM) Congress, Berlin, Germany, August 30, 1998.

Melnichenko, Y. B., G. D. Wignall, R. N. Compton, G. Bakale, and K. A. Affholter, "Characterization of Fullerenes and Fullerene Derivatives by Small-Angle Neutron Scattering and Transmission Measurements," presented at the Meeting of the Electrochemical Society, Symposium on Fullerenes, Montreal, Canada, May 4-9, 1997 (Invited).

Meriaudeau, F., T. Downey, A. Passian, P. I. Oden, A. Wig, P. Crilly, and T. L. Ferrell, "Thin Metal Island Plasmon Sensor," presented at the International Conference on Applications of Photonic Technology, Ottawa, Canada, July 27-30, 1998.

Meriaudeau, F., J. C. De Priest, P. I. Oden, T. Downey, A. Passian, A. Wig, and T. L. Ferrell, "Chemically Sensitive Surface Plasmon Devices Employing a Self-Assembled Composite Monolayer Film," presented at the International Conference on Applications of Photonic Technology, Ottawa, Canada, July 27-30, 1998 (Invited).

Miller, J. C., "Molecular-Clusters: Itsy-Bitsy Bits of Matter," presented at the Department of Physics and Chemistry, North Carolina A&T University, Greensboro, NC, April 7, 1997 (Invited).

Miller, J. C., "The Photophysics and Photochemistry of Molecular Nanoclusters," presented at the Department of Physics, University of Crete, Greece, May 29, 1997 (Invited).

Miller, J. C., "Laser-Induced Organometallic Chemistry Within Clusters," presented at the Sixth Annual Workshop of the Consortium for Nanostructured Materials, Lexington, KY, October 24-25, 1997 (Invited).

Miller, J. C., "Nanochemistry, Chemical Reactions Within Clusters," presented at the Department of Chemistry, State University of New York at Buffalo, NY, March 6, 1998 (Invited).

Miller, J. C., "Lasers in Science and Art," presented at the Department of Physics, Berea College, November 13, 1998 (Invited).

Mirzadeh, S., "Recent Medical Applications of Radium Isotopes," presented at the 26th National Meeting of the American Chemical Society, Boston, MA, August 23-27, 1998 (Invited).

Mirzadeh, S., M. Du, C. W. Alexander, and F. F. Knapp, Jr., "Thermochromatographic Separation of Medical Radioisotopes," presented at the 26th National Meeting of the American Chemical Society, Boston, MA, August 23-27, 1998 (Invited).

Mural, R., E. C. Uberbacher, F. W. Larimer, M. Parang, S. Petrov, M. Shah, J. R. Snoddy, Y. Xu, D. Davey, S. Spengler, M. Zorn, K. Worley, and C. Overton, "Automated Uniform Annotation of Genomic DNA Sequence: The Genome Channel," presented at the18th International Congress of Genetics, Beijing, China, August 10, 1998 (Invited).

Mural, R. J. and L. Hauser, "Current Automated DNA Sequencing and Genotyping Capacity at ORNL," presented to ORAU, Pollard Auditorium, Oak Ridge, TN, April 16, 1998.

Murcia, N. S., B. K. Yoder, W. G. Richards, J. R. Dunlop, M. Mucenski, J. E. Wilkinson, and R. P. Woychik, "TG737 is Highly Expressed in the Node of the Primitive Streak and is Required for Proper Patterning and Survival of the Midgestational Embryo," presented at the Cold Spring Harbor Meeting on Pattern Formation During Development, Cold Spring Harbor, NY, May 28-June 2, 1997.

Nandagopal, K., M. B. Murray, D. E. Davies, C. C. Reddy, D. A. Lauffenburger, and S. K. Niyogi, "Genetically Engineered Variants of Human Epidermal Growth Factor and Their Use in Elucidating the Mechanism of Growth Signaling ," presented at the 1st Annual B.C. Guha Symposium on Recent Trends in Genetic Engineering and Molecular Genetics, Calcutta, India, December 17-21, 1997 (Invited).

Niyogi, S. K., K. Nandagopal, M. B. Murray, S. M. Puddicombe, A. Richter, D. E. Davies, C. C. Reddy, and D. A. Lauffenburger, "Use of Engineered Variants of Human Epidermal Growth Factor (hEGF) in Elucidating Growth Signaling," presented at the Annual Meeting of the American Society of Biochemistry and Molecular Biology, Washington, DC, May 16, 1998.

Nourse, B. D., "UEFPC Characterization Area Baseline Human Health Risk," presented at the Upper East Fork Poplar Creek Characterization Area Remedial Investigation and Risk Assessment(s) Summary Meeting, Oak Ridge, TN, February 18,1997.

Oden, P. I., "Microsensors: An Alternative Use for Scanning Force Microscopy Cantilevers," presented at the Scanning Microscopy Meeting, Chicago, IL, May 10-15, 1997 (Invited).

Oden, P. I., T. Thundat, and R. J. Warmack, "Chemical, Physical and Biological Sensing: An Alternative Use of Scanning Probe Microscopy Cantilevers," presented at the 9th International Conference on Scanning Tunneling Microscopy, Hamburg, Germany, July 20-25, 1997

Oden, P. I., T. Thundat, and R. J. Warmack, "Nanoscale Materials Property Determination for Sensing and Materials Science Appplications Utilizing Microelectrochemical Structures ," presented at the U.S. DOE Energy Workshop on Instrumentation and Measurement Issues for Nanometer Particles, University of Minnesota, Minneapolis, MN, December 5-7, 1997 (Invited).

Oden, P. I., "Scanning Probe Microscopy - Fundamentals and Applications in Surface and Material Science ," presented at the Symposium on Frontiers of Microscopy, University of Memphis, Memphis, TN, April 23, 1998 (Invited).

Oden, P. I., "Atomic Force Microscopy Instrumentation Technology Applied Micromechanical (MEMS) Sensing ," presented at the Symposium on Frontiers of Microscopy, University of Memphis, Memphis, TN, April 23, 1998 (Invited).

Oden, P. I., "Scanning Probe Microscopy: Applications to Surface Science and Sensing," presented at Memphis University, Physics Department, Memphis, TN, June 4, 1998 (Invited).

Oden, P. I., R. L. Jones, C. L. Britton, R. J. Warmack, S. F. Smith, G. M. Brown, W. L. Bryan, J. C. DePriest, M. S. Emery, M. R. Moore, T. Thundat, G. W. Turner, A. L. Wintenberg, T. D. Threatt, Z. Hu, and J. M. Rochelle, "Micromechanical Sensors as Applied to Sensing Various Chemical and Physical Species," presented at NASA LaRC, Hampton, VA, September 16, 1998 (Invited).

Oden, P. I., R. J. Warmack, J. Storey, and C. L. Britton, "Micromechanical Cantilevered Structures for Automotive Sensing Applications," presented at the 1st Annual Compression-Ignition, Direct-Injection (CIDI) Engine Review, Oak Ridge, TN, October 6, 1998.

Oden, P. I., "Chips Come Alive," presented at the Defense Manufacturing Conference, "Gee Whiz" Technologies Session, New Orleans, LA, November 30, 1998 (Invited).

Owen, P. T., "Scientific and Technical Information Sharing with the Decommissioning Community by the Remedial Action Program Information Center (RAPIC)," presented at the Communication and Information Management Workshop X-Change '97, Miami, FL, December 3, 1997 (Invited).

Paulus, M. J., H. Sari-Sarraf, D. K. Johnson, D. H. Lowndes, M. L. Simpson, C. L. Britton, Jr., F. F. Knapp, Jr., and J. S. Hicks, "A New Program to Develop a High-Resolution, High-Throughput Tomographic Imaging System for Mutagenized Mouse Phenotype," presented at the 6th DOE Contractor and Grantee Workshop of the Human Genome Program, Santa Fe, NM, November 13, 1997 (Invited).

Pierce, G. A., A. R. Jones, and S. M. Smith, "Combining a Global Positioning System with Environmental Detection Instruments," presented at the U.S. Army Corps of Engineers Combined Military Programs Environmental Technical Conference and Biennial Safety and Occupational Health, Albuquerque, NM, March 16, 1998.

Pinnaduwage, L. A., W. Ding, D. L. McCorkle, S. H. Lin, A. M. Mebel, and A. Garscadden, "Enhanced Electron Attachment to Rydberg States in Molecular Hydrogen Volume Discharges," presented at the ICPP (International Congress on Plasma Physics) Conference, Prague, Czech Republic, June 29, 1998.

Pinnaduwage, L. A., P. G. Datskos, W. X. Ding, and D. L. McCorkle, "Enhanced Electron Attachment to Highly-Excited States of Molecules: Implications for Plasma Processing Discharges presented at the ICPP (International Congress on Plasma Physics) Conference, Prague, Czech Republic, June 29, 1998.

Pinnaduwage, L. A., W. X. Ding, D. L. McCorkle, and P. G. Datskos, "Enhanced Electron Attachment to Superexcited Rydberg States of Molecular Hydrogen Using a Plasma Mixing Scheme," presented at the ICPP (International Congress on Plasma Physics) Conference, Prague, Czech Republic, June 29, 1998.

Poole, T. L., B. R. Evans, G. J. Bunick, and J. Woodward, "Expression and Characterization of the Enzymes Encoded by *Methanococcus jannaschii* Clones MJ0555 and MJ0960," presented at the 20th Symposium on Biotechnology for Fuels and Chemicals, Gatlinburg, TN, May 3-7, 1998 (Invited).

Popp, R., S. Shinpock, D. Popp, G. Clemons, and D. Van Wyck, "Erythropoietin (EPO) Level and Effect of rHuEPO in Beta-th Mice," presented at the 7th Cooley's Anemia Symposium, Boston, MA, May 30-June 2, 1997 (Invited).

Popp, R. and D. Popp, "Expression of Natural and Induced Variants of Mouse and Human Hemoglobins in Normal and Transgenic Mice," presented at the 9th International Congress on Genes, Gene Families, and Isozymes, San Antonio, TX, April 14, 1997 (Invited).

Puddicombe, S. M., A. Richter, S. G. Chamberlin, M. B. Murray, L. Wood, K. Nandagopal, S. K. Niyogi, and D. E. Davies, "Evidence for Selective Heterodimerisation of the Epidermal Growth Factor Receptor (EGFR) by Site Mutants of EGF," presented at the Symposium on Modes of EGF Receptor Signaling/9th Annual Growth Factor and Signal Transduction Conference, Iowa State University, Ames, IA, September 25-28, 1997.

Ramsey, R. S., R. S. Foote, S. A. McLuckey, F. C. Hartman, and J. M. Ramsey, "Microfluidic Devices Coupled to Mass Spectrometry for Proteome Mapping," presented at Partnering for Functional Genomics Conference, Oak Ridge, TN, April 16, 1998.

Redus, K. S. and K. L. Yuracko, "Optimal Facility and Equipment Specification to Support Cost-Effective Recycling," presented at SPECTRUM '98, International Conference on Nuclear and Hazardous Waste Management, Denver, CO, September 13-18, 1998.

Rice, G., B. F. Lyon, C. L. Arquiett, M. Keating, C. Maxwell, J. Nichols, and J. Swartout, "Assessing Exposure to Mercury Emissions from a Mercury Cell Chlor-Alkali Plant," presented at the Annual Conference of the Society of Toxicology, Cincinnati, OH, March 12, 1997 (Invited).

Richter, A., B. Neelam, S. G. Chamberlin, S. M. Puddicombe, M. B. Murray, K. Nandagopal, S. K. Niyogi, and D. E. Davies, "Structure-Activity Studies of Ligand-Induced Epidermal Growth Factor Receptor Dimerization," presented at the Symposium on Modes of EGF Receptor Signaling/ 9th Annu. Growth Factor and Signal Transduction Conf., Iowa State University, Ames, IA, September 25-28, 1997.

Rinchik, E. M., C. T. Culiat, C. J. Foltz, P. R. Hunsicker, E. J. Michaud, L. B. Russell, Y. You, M. J. Justice, T. Vo-Dinh, K. L. Beattie, M. J. Doktycz, S. J. Kennel, M. J. Paulus, M. N. Ericson, G. A. Sega, M. V. Buchanan, and D. K. Johnson, "Mouse Genetics and Mutagenesis for Functional Genomics," presented at the Life Sciences Division Information Meeting, ORNL, Oak Ridge, TN, April 28, 1998 (Invited).

Rinchik, E. M., D. A. Carpenter, L. Webb, D. K. Johnson, Y. Ji, and R. D. Nicholls, "Regional Mutagenesis with Hemizygosity Screening and N-Ethyl-N-Nitrosourea (ENU): New Data on the Pink-Eyed Dilution (p) Region of Mouse Chromosome ," presented at the Mouse Molecular Genetics Meeting, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, September 2-6, 1998 (Invited).

Rinchik, E. M., D. A. Carpenter, E. J. Michaud, and D. K. Johnson, "The Chromosome-7 Mutagenesis Program at the Oak Ridge National Laboratory," presented at the 12th International Mouse Genome Conference, Garmisch-Partenkirchen, Germany, September 30, 1998 (Invited).

Rouleau, C. M., D. H. Lowndes, J. D. Budai, and T. Thundat, "Growth and p-Type Doping of Epitaxial II-Vi Compound Semiconductor Films by Pulsed Laser Ablation in Ammonia," presented at the 4th International Conference on Laser Ablation, Pacific Grove, CA, July 21-25, 1997.

Russell, L. B., P. R. Hunsiker, D. K. Johnson, and M. D. Shelby, "Unlike Other Chemicals, a Topoisomerase-II Inhibitor Produces Peak Mutagenicity in Primary Spermatocytes of the Mouse," presented at the 29th Annual Meeting of the Environmental Mutagen Society, Anaheim, CA, March 21, 1998 (Invited).

Ryman, J. C. and K. F. Eckerman, "Improved Specific Absorbed Fractions of Photon Energy for Age- and Gender-Dependent Internal Dosimetry," presented at the American Nuclear Society Radiation Protection and Shield Top Conference (RP&S), Nashville, TN, April 19-23, 1998.

Schmoyer, R. L., B. F. Lyon, P. B. Selby, and S. E. Stinnette, "Estimation of Concentration of Chemicals in the Environment: What Is Background?," presented at the Meeting of the American Chemical Society, Birmingham, AL, May 6, 1997 (Invited).

Schryver, J. C., K. C. Goss, and D. K. Johnson, "Behavior Testing in 723SJ/1060SJ Carrier Animals: A Chemically-Induced Point Mutation," presented at the 7th International Behavioral Neuroscience Society Conference, Richmond, VA, June 11-14, 1998.

Shafizadeh, N., Ph. Bréchignac, M. Dyndgaard, D. Gauyacq, J. H. Fillion, M. Raoult, B. Levy, and J. C. Miller, "Bound-Bound and Bound-Free A-X Transition of the NO-Ar van der Waals Molecule Studied by Laser Induced Fluoroscence; Preliminary Theoretical Interpretation," presented at the XVII International Symposium on Molecular Beams, Paris, France, June 2-6, 1997.

Siegrist, R. L., K. S. Lowe, L. W. Murdoch, T. Case, D. A. Pickering, and T. C. Houk, "In Situ Chemical Oxidation by Emplaced Reactive Solids," presented at the Workshop on In-Situ Chemical Oxidation for Site Remediation, WEFTEC '97, Chicago, IL, Water Environment Federation, October 19, 1997 (Invited).

Siegrist, R. L., O. R. West, S. R. Cline, N. E. Korte, K. S. Lowe, F. G. Gardner, R. M. Schlosser, D. A. Pickering, T. L. Case, M. A. Urynowicz, L. W. Murdoch, and T. C. Houk, "In Situ Chemical Oxidation at DNAPL Sites Using $KmnO_4$ Reactive Solids and Solutions," presented at the National Research Council's Committee on Technologies for Cleanup of Subsurface Contaminants in the DOE Weapons Complex, Augusta, GA, February 18-20, 1998 (Invited).

Siegrist, R. L., K. S. Lowe, D. A. Pickering, T. L. Case, L. W. Murdoch, and T. C. Houk, "Horizontal Barriers with Emplaced Iron Metal and Permanganate Reactive Sheets," presented at the NATO/CCMS Country Representatives Meeting, Special Session on Treatment Wells, Vienna, Austria, February 24, 1998.

Snoddy, J., "The Genome Annotation Consortium: Development of a Biological Information System," presented at the Strategic Planning Workshop on a Comparative Database, Minnesuing Aces, WI, November 2, 1997 (Invited).

Snoddy, J., M. Parang, S. Petrov, R. Mural, M. Shah, Y. Xu, S. Martin, P. LoCascio, E. Uberbacher, B. Worley, C. Overton, M. Zorn, S. Spengler, and D. Davey, "Progress Towards a Decision Support System for Genome Annotation," presented at the Genome Mapping, Sequencing and Biology Meeting, Cold Spring Harbor, NY, May 13, 1998 (Invited).

Snoddy, J., M. Parang, S. Petrov, R. Mural, M. Shah, Y. Xu, S. Martin, P. LoCascio, and E. Uberbacher, "Progress in Automating Genome Annotation," presented at the 5th International Automation in Mapping and DNA Sequence Conf., St. Lous, MO, October 7, 1998 (Invited).

Stabin, M. G., M. Konijnenberg, F. F. Knapp, Jr., and R. H. Spencer, "Rhenium-188 Liquid Filled Balloons for Vascular Therapy - Tungsten-188/Rhenium-188 Generator Performance and Concentration of Re-188 to High Specific Volumes," presented at Advances in Cardiovascular Radiation Therapy, Washington, DC, March 8, 1998.

Stabin, M. G., M. Konijnenberg, F. F. Knapp, Jr., and R. H. Spencer, "Interactive Computer Program for Calculation of Radiation Dose to the Walls of Blood Vessels in Intravascular Radiation Therapy," presented at Advances in Cardiovascular Radiation Therapy, Washington, DC, March 8, 1998.

Taranenko, N. I., L.-Y. Chang, C. H. Chen, S. L. Allman, V. V. Golovlev, and Y. F. Zhu, "DNA Typing by MALDI for Forensic Applications," presented at the 45th American Society of Mass Spectrometry Conference on Mass Spectrometry and Related Topics, Palm Springs, CA, June 1-5, 1997 (Invited).

Taranenko, N. I., L.-Y. Chang, C. H. Chen, K. J. Matteson, S. L. Allman, K. Tang, S. A. Martin, and L. Haff, "Population Screening of DNA Mutation by MALDI," presented at the 45th American Society of Mass Spectrometry Conference on Mass Spectrometry and Related Topics, Palm Springs, CA, June 1-5, 1997 (Invited).

Taranenko, N. I., V. V. Golovlev, N. R. Isola, S. L. Allman, Y. F. Zhu, K. J. Matteson, N. T. Potter, L. Y. Chang, and C. H. Chen, "Laser Desorption Mass Spectrometry for DNA Analysis and Sequencing," presented at the Partnering for Functional Genomics Workshop, Oak Ridge, TN, April 16, 1998.

Thundat, T., P. I. Oden, and R. J. Warmack, "Chemical, Physical, and Biological Detection Using Microcantilevers," presented at the Symposium on Microstructures and Microfabricated Systems, Spring Meeting of the Electrochemical Society, Montreal, Canada, May 4-9, 1997 (Invited).

Thundat, T., "Chemical, Physical, Biological Detection Using Microcantilevers," presented at the Naval Research Laboratory, Washington, DC, June 16, 1997 (Invited).

Thundat, T., "Microcantilever Array Sensors," presented at the Thermophysical Phenomena in Microscale Sensors, Devices, and Structures Workshop, Baltimore, MD, August 9, 1997 (Invited).

Thundat, T., "Microcantilever Array Sensors," presented at the University of Virginia, Charlottesville, VA, September 14, 1997 (Invited).

Thundat, T., "Microcantilever Array Sensors," presented at the Alabama Material Research Society Meeting, Huntsville, AL, September 25-26, 1997 (Invited/Keynote Address).

Thundat, T., "Microcantilever Sensors," presented at the 37th ORNL-DOE Conference on Analytical Chemistry in Energy Technology, Gatlinburg, TN, October 7-9, 1997 (Invited).

Thundat, T., "Microcantilever Array Sensors," presented at the Materials Science Department Colloquium, University of Illinois, Urbana, IL, November 24, 1997 (Invited).

Thundat, T., "Imaging and Non-Imaging Applications of Scanning Probe Microscopy," presented at The University of Tennessee Materials Science Department, Knoxville, TN, February 5, 1998 (Invited).

Thundat, T., P. I. Oden, and R. J. Warmack, "Microcantilever Array Sensors," presented at the Weld. Test. Technology Conference, WATTEC-98, Knoxville, TN, February 7, 1998 (Invited).

Thundat, T., "Micromechanical Chemical and Biological Sensors," presented at Monsanto, St. Louis, MO, April 23, 1998 (Invited).

Thundat, T., P. I. Oden, R. J. Warmack, and G. M. Brown, "Microcantilever Sensors for Environmental Monitoring," presented at the Meeting of the Electrochemical Society, San Diego, CA, May 3-5, 1998.

Thundat, T., "Micromechanical Array Sensors for Chemical and Biological Detection," presented at the University of Bourgogne, Laboratoire de Photoelectricite, Dijon, France, May 18, 1998 (Invited).

Thundat, T., P. I. Oden, M. J. Doktycz, R. J. Warmack, and C. L. Britton, "Microcantilever Sensors," presented at the Gordon Research Conference, New England College, Henniker, NH, July 12-18, 1998 (Invited).

Uberbacher, E., R. Mural, M. Shah, Y. Xu, S. Martin, S. Petrov, J. Snoddy, M. Parang, M. Zorn, S. Spengler, D. Davey, T. Gaasterland, and C. Overton, "Large-Scale Framework for Analysis and Annotation of Genomic Sequences," presented at the Conference on Computational Genomics, Herndon, VA, November 1, 1997.

Uberbacher, E. C., R. J. Mural, M. B. Shah, Y. Xu, S. A. Martin, S. Petrov, J. R. Snoddy, M. Parang, M. Zorn, S. Spengler, D. Davey, T. Gaasterland, P. Schaad, S. Letovsky, B. Cottingham, D. Haussler, P. Pavzner, and C. Overton, "The Genome Channel and Genome Annotation Consortium," presented at the 6th DOE Contractor and Grantee Workshop, Santa Fe, NM, November 9-13, 1997 (Invited).

Uberbacher, E. C., Y. Xu, M. B. Shah, V. Olman, M. Parang, and R. J. Mural, "An Editing Environment for DNA Sequence Analysis and Annotation," presented at the 3rd Pacific Symposium on Biocomputing, Kapalua, HI, January 5, 1998.

Uberbacher, E., R. Mural, M. Shah, Y. Xu, S. Martin, S. Petrov, M. Parang, J. Snoddy, M. Zorn, S. Spengler, D. Davey, T. Gaasterland, and C. Overton, "Large-Scale Framework for Analysis and Annotation of Genomic Sequences," presented at ORAU, Pollard Auditorium, Oak Ridge, TN, April 16, 1998.

Uberbacher, E., "Computational Biosciences Sections Research ," presented at the Life Sciences Division Information Meeting, ORNL, Oak Ridge, TN, April 28, 1998 (Invited).

Uberbacher, E. C. and Y. P.-I. D. D. P. Xu, "Overview of PSB Track on Gene Structure Identification in Large-Scale Genomic Sequence," presented at the 3rd Pacific Symposium on Biocomputing, Kapalua, HI, August 5, 1998.

Uberbacher, E., D. Hyatt, F. Larimer, P. LoCascio, R. Mural, M. Parang, S. Petrov, M. Shah, J. Snoddy, Y. Xu, D. Davey, S. Spengler, M. Zorn, K. Worley, and C. Overton, "Genome Analysis by the Genome Annotation Consortium: Progress Towards a Comprehensive Analysis Process to Aid Biologists in Studying Genes and Genomes," presented at the10th International Genome Sequencing and Analysis Conference, Miami, FL, September 17, 1998 (Invited).

Valencia, M., P. Mazur, and L. H. Miller, "The Use of Phloroglucinol in the Permeabilization and Vitrification of Anopheles Mosquito Embryos," presented at the 34th Annual Meeting of the Society of Cryobiology, Spain, June 8, 1997 (Invited).

Vo-Dinh, T., D. M. Hueber, A. D. Campiglia, and F. Moreau, "A Novel Phosphorescence Imaging System Using an Acousto-Optic Tunable Filter (AOTF) Device for PACs Monitoring," presented at the 16th International Symposium on PACs (Polycyclic Aromatic Compounds), Charlotte, NC, November 4-8, 1997 (Invited).

Vo-Dinh, T., "Chemical Sensors and Biosensors for Measurement of Nanosystems in Liquids," presented at the U.S. DOE Energy Workshop on Instrumentation and Measurement Issues for Nanometer Particles, University of Minnesota, Minneapolis, MN, December 5-7, 1997 (Invited).

Wachter, E. A., W. P. Partridge, W. G. Fisher, H. C. Dees, and M. G. Petersen, "Simultaneous Two-Photon Excitation of Photodynamic Therapy Agents," presented at Photonics West, San Jose, CA, January 1998.

Warmack, R. J., "Biotechnology," presented at the Life Sciences Division Information Meeting, Oak Ridge, TN, April 28,1998 (Invited).

Weaver, K., M. Doktycz, P. Britt, G. D. Hurst, and M. V. Buchanan, "96-Well Microtiter-Format Purification of DNA for MALDI-TOF Analysis," presented at the 46th American Society of Mass Spectrometry Conference on Mass Spectrometry and Allied Topics, Orlando, FL, May 31-June 4, 1998.

Webb, L. S., D. K. Johnson, and G. A. Sega, "Analysis of Fatty Acids in Plasma by GC/MS: An Integral Part of an Applied Cloning Strategy," presented at Pittsburgh Conference '98, New Orleans, LA, March 1, 1998.

Webb, O. F., R. A. Boll, S. J. Kennel, and A. M. Krichinsky, "Separation of the Thorium-229 Alpha Emitter Chain for Cellular Surgery," presented at the Purdue Chromatography Workshop '97, West Lafayette, IN, October 6-7, 1997.

Webb, O. F., R. A. Boll, D. W. Depaoli, A. M. Krichinsky, and B. D. Patton, "Separation of Thorium-229 for Production of Alpha Emitters," presented at the Meeting of the American Nuclear Society, Albuquerque, NM, November 16-20, 1997 (Invited).

Webb, O. F., B. D. Patton, S. J. Kennel, S. Mirzadeh, and A. M. Krichinsky, "Oak Ridge National Laboratory Alpha-Emitter Program, Beneficial Uses in Targeted Cellular Surgery," presented at WATTeC, Knoxville, TN, February 16-18, 1998 (Invited).

Webb, O. F., A. M. Krichinsky, S. Mirzadeh, and B. D. Patton, "Oak Ridge National Laboratory Alpha Emitter Program--Production of Thorium-229 from Uranium-233," presented at the Spring Meeting of the American Chemical Society, Dallas, TX, March 29-April 2, 1998.

Weber, J. S., S. Braunstein, D. A. Carpenter, and M. J. Justice, "Physical Mapping and ENU Mutagenesis in the 'Brown' (b) Delection Complex," presented at the 11th International Mouse Genome Conference, St. Petersburg, FL, October 16, 1997 (Invited).

Weeks, R. A., J. M. Elam, J. S. Bogard, and C. Davenport, "Age of the Harrison Street Beast: Electron Paramagnetic Resonance Spectra from Tooth Enamel," presented at the Annual Meeting of the Society of American Archaeologists, Seattle, WA, March 25-29, 1998.

West, O. R., S. R. Cline, R. L. Siegrist, T. C. Houk, W. L. Holden, F. G. Gardner, and B. M. Schlosser, "A Field-Scale Test of In-Situ Chemical Oxidation Through Recirculation," presented at. Spectrum '98, International Conference on Decommissioning and Decontamination/Nuclear and Hazardous Waste Management, Denver, CO, September 13-18, 1998.

Wilson, J. E., J. R. Davidson, Jr., and C. A. Little, "Visual Sample Plan," presented at TechnoVentions '98, Lake Buena Vista, FL, December 9-12, 1998 (Invited).

Wilson, J. E., J. R. Davidson, Jr., and C. A. Little, "Visual Sample Plan," presented at the 10th National Technology Information Exchange (TIE) Workshop, Willowbrook, IL, October 27-29, 1998 (Invited).

Woychik, R. P., E. J. Michaud, R. L. Mynatt, R. J. Miltenberger, M. L. Klebig, J. E. Wilkinson, W. O. Wilkison, and M. B. Zemel, "Role of the Agouti Gene in Obesity," presented at the University of Arkansas Symposium on Obesity: Common Sympton of Diverse Gene-Based Metabolic Dysregulations, Fayetteville, AR, March 4, 1997 (Invited).

Xu, D., M. A. Unseren, Y. Xu, and E. C. Uberbacher, "Assessing the Specificity of an Energy Function Through Threading at the Protein Secondary Structure Level," presented at the 3rd Community Wide Experiment on the Critical Assessment of Techniques for Protein Structure Prediction, Asilomar, CA, December 13, 1998.

Xu, Y., M. B. Shah, J. R. Einstein, M. Parang, J. Snoddy, S. Petrov, V. Olman, G. Zhang, R. J. Mural, and E. C. Uberbacher, "GRAIL and GenQuest Sequence Annotation Tools," presented at the 6th DOE Contractor and Grantee Workshop, Santa Fe, NM, November 9-13, 1997 (Invited).

Xu, Y., D. Xu, and E. C. Uberbacher, "A New Method for Modeling and Solving the Protein Fold Recognition Problem," presented at the 2nd Annual International Conference on Computational Molecular Biology, New York, NY, March 22, 1998.

Xu, Y., D. Xu, and E. Uberbacher, "Solving Globally Optimal Threading Problem in Polynomial-Time," presented at Structure-Based Functional Genomics, Avalon, NJ, October 4-7, 1998.

Xu, Y., O. Crawford, J. R. Einstein, M. A. Unseren, D. Xu, G. Zhang, and E. C. Uberbacher, "A Template-Based Secondary Structure Prediction System," presented at the 3rd Community Wide Experiment on the Critical Assessment of Techniques for Protein Structure Prediction, Asilomar, CA, December 13, 1998.

Xu, Y., D. Xu, O. H. Crawford, J. R. Einstein, F. W. Larimer, M. A. Unseren, G. Zhang, and E. C. Uberbacher, "PROSPECT: A Threading-Based Protein Structure Prediction System," presented at the 3rd Community Wide Experiment on Critical Assessment of Techniques for Protein Structure Prediction, Asilomar, CA, December 13, 1998 (Invited).

Yuracko, K. L., M. Gresalfi, P. Yerace, J. Flora, M. Krstich, and D. Gerrick, "A Life Cycle Analysis Approach to D&D Decision-Making," presented at Spectrum '98, International Conference on Nuclear and Hazardous Waste Management, Denver, CO, September 13-18, 1998 (Invited).

Zeighami, E. A., E. A. Goldberg, and K. M. Spencer, "LEADIS - A Computer Decision System for Identifying Potentially Contaminated Nuclear Material Use Sites (Draft)," presented at the Topical Meeting of the American Nuclear Society, Knoxville, TN, September 5-7, 1997.

Patents Issued, CY 1997–1998

Beattie, K. L.
U.S. Patent: 5,843,767
Date Issued: 12/1/1998
Flowthrough Porous Apparatus for Discrete Detection of Binding Reactions

Dees, H. C. (formerly of HSRD)
U.S. Patent: 5,698,429
Date Issued: 12/16/1997
Cellulase-containing cell-free fermentate produced from microorganism ATCC 55702

Dees, H. C. (formerly of HSRD)
U.S. Patent: 5,702,940
Date Issued: 12/30/1997
Cellulase producing microorganism ATCC 55702

Dees, H. C. (formerly of HSRD)
U.S. Patent: 5,756,337
Date Issued: 5/26/1998
Method of producing a cellulase-containing cell-free fermentate produced from microorganism ATCC 55702

Dees, H. C. (formerly of HSRD)
U.S. Patent: 5,780,422
Date Issued: 7/14/1998
Detergent composition comprising a cellulase containing cell-free fermentate produced from microorganism ATCC 55702 or mutant thereof

Dees, H. C. (formerly of HSRD)
U.S. Patent: 5,789,227
Date Issued: 8/4/1998
Processing of cellulosic material by a cellulase-containing cell-free fermentate produced from cellulase-producing bacteria, ATCC 55702

Easterly, C. E., A. A. Vass, R. L. Tyndall (retired)
U.S. Patent 5,597,729
Date Issued: 1/28/1997
Method for the removal and recovery of mercury

Foote, R. L. (now in CASD)
U.S. Patent: 5,661,028
Date Issued: 8/26/1997
Large scale DNA microsequencing device

Garrett, W. R. (retired)
U.S. Patent: 5,686,988
Date Issued: 11/11/1997
Gas concentration measurement instrument based on the effects of a wave-mixing interference on stimulated emissions

Knapp, F. F., Jr., A. L. Beets, S. Mirzadeh, and S. Guhlke
U.S. Patent: 5,729,821
Date Issued: 3/17/1998
Concentration of perrhenate and pertechnetate solutions

Mirzadeh, S., F. F. Knapp, Jr., and E. D. Collins
U.S. Patent: 5,774,782
Date Issued: 6/30/1998
Technetium-99m generator system

Thundat, T. G. and E. A. Wachter
U.S. Patent: 5,719,324
Date Issued: 2/17/1998
Microcantilever sensor

Tyndall, R. L. (retired)
U.S. Patent: 5,610,062
Date Issued: 3/11/1997
Dispersant solutions for dispersing hydrocarbons

Vo-Dinh, T.
U.S. Patent: 5,599,717
Date Issued: 2/4/1997
Advanced synchronous luminescence system

Vo-Dinh, T.
U.S. Patent: 5,721,102
Date Issued: 2/24/1998
Surface enhanced Raman gene probe and methods thereof

Vo-Dinh, T.
U.S. Patent: 5,783,389
Date Issued: 7/21/1998
Surface enhanced Raman gene probe and methods thereof

Vo-Dinh, T.
U.S. Patent: 5,814,516
Date Issued: 9/29/1998
Surface enhanced Raman gene probe and methods thereof

Vo-Dinh, T.
U.S. Patent: 5,864,397
Date Issued: 1/26/1999
Surface-enhanced raman medical probes and system for disease diagnosis and drug testing

Woychik, R. P. (formerly of Life Sciences Division)
U.S. Patent: 5,789,651
Date Issued: 8/4/1998
Isolation and characterization of Agouti: a diabetes/obesity related gene

Woychik, R. P. (formerly of Life Sciences Division)
U.S. Patent: 5,843,652
Date Issued: 12/1/1998
Isolation and characterization of Agouti: a diabetes/obesity related gene

Invention Disclosures, CY 1997–1998

Beattie, K. L.
ERID 0322, S-87,658
Microfabricated, Flowthrough Porous Apparatus for Discrete Detection of Binding Reactions
(submitted prior to LMER employment; Houston Advanced Research Center; assigned to LMER/DOE)
1997

Britton, C. L., Jr., R. J. Warmack, W. L. Bryan, R. L. Jones, P. I. Oden, and T. Thundat
ERID 0501, S-90,091
A Capacitively Readout Multielement Sensor Array with Common-Mode Cancellation
LDRD
5/98

Doktycz, M. J., W. L. Bryan, and R. Kress
ID 0644, S-90,891
Dual Manifold System for Arraying Biomolecules
LDRD-funded
11/98

Ferrell, T. L., M. L. Simpson, R. J. Warmack, P. B. Crilly, and D. L. Hedden
ERID 0337, S-87,689
Omnidirectional, Free-Space, Photonic, Multiconnect System for Electronic Circuits
KP01
4/97

Golovlev, V. V.
ID 0639, S-92,514
Fourier Transform Deconvolution for Enhancing Spectral Resolution
KP13
12/98

Kennel, S. J. and S. Mirzadeh
ERID 0266
Targeting of Alpha Particle Emitting Radioisotopes for Radiotherapy
KP14
8/98

Kuritz, T.
ERID 0463, S-90,042
Cultivation of a Bacterial Strain with an Accelerated Growth Rate
Division Overhead-funded
1/98

McPherson, D. W.
ERID 0531, S-90,822
In Vivo Method for Determination of Muscarinic Ligand Subtype Selectivity
KP14
6/98

Menon, M. M., T. G. Thundat, and P. I. Oden
ERID 0412, S-88-682
Miniature Vacuum Gauge and Residual Gas Analyzer Based on Microcantilever
Division Overhead-funded
9/97

Mirzadeh, S., S. Aaron, and L. Zevenbergen
ERID 0626, S-90,872
A New Indium-114m Brachytherapy Source
ST04
10/98

Oden, P. I., C. L. Britton, Jr., S. F. Smith, and R. J. Warmack
ID 0636, S-90,886
Multi-Modal Analysis of Micromechanical Structures for Sensing Applications
LDRD-funded
11/98

Pinnaduwage, L. A. and W. Ding
ID 0647, S-90,893
Method for Suppression of Dust Formation in Material Processing Discharges
EW40
11/98

Thundat, T. G., P. I. Oden, and P. G. Datskos
ERID 0357, S-88,601
Wavelength Dispersive Infrared Detector and Micro-Spectrometer Using Cantilevers
KP01
5/1/97

Thundat, T. G., I. Sauers, and P. I. Oden
ERID 0393, S-88,652
Microcantilever Detector for Gas Chromatography
KP01
7/18/97

Thundat, T. G. and P. I. Oden
ERID 0353,S-87,693
Acoustic Sensing Using Phased Array Microsensors
KP14
4/97

Thundat, T. G., P. I. Oden, and R. J. Warmack
ERID 0516, C-90,806
Micromechanical Transient Sensor for Measuring Viscosity and Specific Gravity
KP14
5/98

Thundat, T. G.
ERID 0545, S-90,840
Chemical Coatingless Chemical Sensors
KP14
7/98

Thundat, T. G. and T. L. Ferrell
ID 0651, S-90,900
Differential Phase Microcantilever Sensor
KP01
12/98

Varma, V. K., J. C. Lewis, D. A. Waters, T. G. Thundat, and C. M. Egert
ERID 0332, Y-87,672/ESID 1933-Y-87,672
Chemical Nano-Explosion Based Battery
RPSD Overhead
3/97

Vass, A. A. and R. L. Tyndall
ERID 0491, S-90,079
Antimicrobial Effect of an Amobae/Bacterial Preparation
ORNL Seed Money
4/98

Vo-Dinh, T. and A. Sadana
ERID 0349, S-88,606
Fractal Analysis with Space-Time (FAST) Coordinate Conversion
KP01
5/97

Vo-Dinh, T.
ERID 0309, S-88,681
SERMED Nanoprobes
KP01
9/97

Vo-Dinh, T., A. Wintenberg, and M. N. Ericson
ERID 0271, S-87,647
Integrated Circuit Microsystem (ICM) for DNA Biochips
KP01/LDRD
1997

Vo-Dinh, T. and S. J. Norton
ERID 0335, S-87,674
Spectro-Acoustically Enhanced Ultrasonic (SEUS) Detection for Biomedical Diagnosis
KP01
3/14/97

Vo-Dinh, T.
ERID 0454, S-90,030
Raman and Surface-Enhanced Raman Gene (SER-G) Probe and Detection System
KP01
1/98

Vo-Dinh, T.
ID 0659, S-90,908
SERS Biochip
KP11/LDRD
12/98

Vo-Dinh, T.
ID 0660, S-90,909
Advanced Multifunctional Biochip
KP11
12/98

Wachter, E. A., G. L. Powell, and J. E. Parks
ERID 0287C, S-87,686; ESID 1934-YC, S-87,686
Improved Method for Rapid Analysis of Synthetic Fibers
KJ02; CRADA ORNL 95-0352
4/97

Wachter, E. A., and C. M. Smith
ERID 0400, S-88,657
Microencapsulation Method for Munition Primers
Division overhead-funded
7/24/97

Woychik, R. P.
ERID 0402, S-88,662
Utilizing Yeast as an Intermediate Host for Constructing Mouse Gene Disruption Vectors by Homologous Recombination
WFO ERD-96-1374
8/97

Staff Honors, Awards, External Appointments, and Conference Participation, CY 1997–1998

Abston, J. P.	1998 LMER Operations and Support Award for Operations Support (team)
	Certified Occupational Health and Safety Technology, American Board of Industrial Hygiene and Board of Certified Safety Professionals
Alarie, J. P.	1997 Royalty Sharing Award for "Fiberoptics Luminoscope and Optical Biopsy"
Allison, D. P.	1997 LMER Technical Achievement Award for Research Accomplishment (team)
	Committee Chair/Organizer, Scanning Probe Microscopy Session, *Scanning Microscopy International Meeting*, Chicago, Illinois, May 1997
	Editorial Board, *Scanning Microscopy*
Allred, J. F.	1998 LMER Operations and Support Award for Operations Support (team)
Bast, C. S.	Diplomate, American Board of Toxiciology, 1998-2003
Beattie, K. L.	Workshop Organizer, "New Genomics Technologies," *1998 Annual Meeting of the Environmental Mutagen Society*, Anaheim, California, March 1998
	National Institutes of Health Review Panel, July 1998
Beatty, B. R.	Chair, ORNL Animal Care and Use Committee
	Board of Directors, Appalachian Branch of American Association of Laboratory Animal Science
	Awards Committee, Association for Women in Science
Beets, A. L.	1997 LMER Technical Achievement Award for Research Accomplishment (team)
Berven, B. A.	Co-Chair, 1998 Lockheed Martin United Way Campaign
	Loaned Executive for United Way of Anderson County, 1998
	Chair, 1998 Annual Health Physics Society Meeting, Session on Radon
	Member, ORNL Fix-It Committee Member
	Member, LMES Library Advisory Committee, 1998
	Member, LMES Travel Committee, 1997-1998
	LMES Job Evaluation Review Committee
	ORNL Competitive Cost Proposal Committee
	Member, ORNL Land and Facilities Use committee

	Member, ORNL Steering Committee, Integrated Safety Management System
	Adjunct Professor, Department of Ecology and Evolutionary Biology, The University of Tennessee, Knoxville
	Acting Director, Joint Institute for Biological Sciences (UT/ORNL)
Bogard, J. S.	Adjunct Professor, Department of Anthropology, The University of Tennessee, Knoxville
	Program Committee, *International Conference on Environmental Monitoring and Remediation Technologies*, sponsored by the International Society for Optical Engineering, Boston, Massachusetts, November 1998
	Chairman, HPSSC/ANSI N13.27 Working Group, "Performance Specifications for Pocket-Sized Alarming Dosimeters/Ratemeters"
	Member, HPSSC/ANSI N13.22 Working Group, "Bioassay Programs for Uranium"
	Member, NCRP Scientific Committee 57, Task Group 15, "Uranium: Radiation Protection Guidelines"
	Member, Health Physics Society Laboratory Accreditation Policy Committee
Bunick, G. J.	Member, National Institutes of Health, Biophysical Chemistry Special Study Section, March 1997
	Knoxville Gateway Pavilion Exhibit, 1997
	Team Leader, Oxford Cryosystem Award, *1997 American Chemistry Associate Meeting*
	Co-Chair, Life Sciences Section, ORAU/SNS Workshop, 1998
	Lecturer, ORNL representative at 1998 Space Day observances
	1998 LMER Technical Achievement Award for Research Accomplishment (team)
	Charter Member, Southeast Regional Collaborative Access Team (SERCAT)
Carpenter, D. A.	Member, ORNL Animal Care and Use Committee
Casey, D. K.	Member, Human Genome Organization
Chen, C.-H.	Editorial Board, *Rapid Communicaitons in Mass Spectrometry*
	1998 LMER Technical Achievement Award for Research Accomplishment
Coleman, R. L.	Certified, American Board of Health Physics
Crawford, O. H.	Member, Organizing Committee, *1997 Symposium on Fundamental Physics in Microscopy and Microanalysis*, Chicago, Illinois, May 1997
	Member, Organizing Committee, *17th Werner Brandt Workshop on Charged Particle Penetration*, Charlottesville, Virginia, May 1997

Davidson, K. A.	ORNL/ARAU Institutional Review Board, 1998
Doktycz, M. J.	1997 LMER Technical Achievement Award for Research Accomplishment (team)
Easterly, C. E.	Member, Safety-controls Optimations by Performance Evaluation (SCOPE) Experts Panel
	National Laboratory Directors' Environmental and Occupational/Public Health Steering Group, ORNL Representative
	Liaison, National Council on Radiation Protection and Measurements and National Association of Environmental Professionals
	Member, Conference Planning Committee and Session Chair, *Non-Lethal III*, 1998
	Expert, Review Panel for Hanford Tanks Flammable Gas Issue, 1998
Eckerman, K. F.	Adjunct Professor, University of Tennessee, Knoxville
	National Council on Radiation Protection (NCRP) Scientific Committee on Dosimetry and Metabolism of Radionuclides (SC-57)
	NCRP Scientific Committee on Radionuclides in the Environment (SC-64)
	International Council on Radiation Protection (ICRP) Committee 2 on Secondary Limits
	ICRP Task Group on Dose Calculations, Chairman
	ICRP Task Group on Reference Man, Chairman
	ICRP Task Group on Internal Dosimetry (*ex officio* member)
	ICRP Task Group on a Dosimetric Model for the Alimentary Tract (*ex officio* member)
	National Research Council Committee on Risk Assessment of Radon in Drinking Water
Egidi, P. V.	Health Physics Society Working Group on NORM
Ferrell, T. L.	Research Professor, Physics Department, University of Tennessee, Knoxville
Foltz, C. J.	Adjunct Professor, Division of Comparative Medicine, University of Tennessee, Knoxville
	Diplomate, American College of Laboratory Medicine
Gambrell, S. C.	Member, ORNL Committee for Women
	Member, ORNL Administrative Computing Steering Committee
	Member, ORNL Year 2000 Committee
Gipson, L. C.	1997 LMER Operations and Support Award for Administrative Support
Gresalfi, M. J.	Member, U.S. Commission on People with Disabilities
	Senior Washington, D.C., Representative to ORO-based DOE National Center of Excellence for Metals Recycle

Griffin, G. D.	Judge, Biochemistry Section, Intel Internation Sciences and Engineering Fair, Louisville, Kentucky, May 1997
Halford, D. K.	President-Elect, Colorado Chapter of the Wildlife Society; Executive Board
Hartman, F. C.	Editorial Board Member, *Journal of Biological Chemistry*
	Editorial Board Member, *Journal of Protein Chemistry*
	Member, Site-Review Panel for the Protein Engineering Network of Centres of Excellence (funded by the Canadian National Research Council for protein engineering research at multiple Canadian universities)
Hingerty, B. E.	National Science Foundation, reviewer of NATO postdoctoral fellowship candidates
	National Research Council, reviewer of NRC research associate proposals
	DOE-OBER representive for Life Sciences on the Energy Research Supercomputer User's Group Executive Committee for Lawrence Berkeley National Laboratory, National Energy Research Scientific Computing Center, Vice-Chair
	ORISE Traveling Lecture Program Speaker; ORISE Tennessee Visiting Scientist, 1997–98
Houser, K. J.	1998 LMER Technical Achievement Award for Technical Support (team)
James, D. R.	1998 IEEE International Symposium on Electrical Insulation, Publications and Publicity Chair
	Member, IEEE Dielectrics and Electrical Insulation Society Subcommittee S-32-11 on Gaseous Dielectrics
Johnson, C. A.	WATTEC Sponsors Committee, Secretary, 1997–98
	WATTEC Sponsors Committee, American Women in Science Representative, 1998–99
Kennel, S. J.	1997 Royalty Sharing Award, "Rat Hybridoma 346-11A Reacting with Mouse Protein"
	Member, Environmental Protection Agency Review Panel, 1998
Kennel, S. J.	*American Chemical Society Meeting*, Orlando, Florida, 1997, Session Chair, Radioisotope Chemistry
Kerr, G. D.	Radiation Effects Research Foundation, Hiroshima and Nagasaki, Japan, Consultant
	International Committee on Radiation Protection (ICRP) Committee 2, Task Group for the Revision of Refernce Man, Member
Knapp, F. F., Jr.	LMER Corporate Fellow, 1997
	1997 R&D 100 Award, "Development of Modular Technitium-99m Concentrator" (with S. Mirzadeh and E. D. Collins)
	Editorial Board, *European Journal of Nuclear Medicine* (1993–Present)
	Editorial Board, *Journal of Applied Radiation and Isotopes* (1994–Present)

Editorial Board, *Journal of Clinical Physiology*

ORAU/ORNL Committee for Human Studies (1992–Present)

1997 Annual Meeting, Society of Nuclear Medicine, San Antonio, Texas, June 1997 – Abstract Review Committee, Therapeutics Session; Session Chairman, Radiopharmaceuticals VI

Chairman, Medical Radioisotope Session, *Radioisotope Symposium*, Marianske Lazne, Czech Republic, April 1998

1998 Annual Meeting, Society of Nuclear Medicine, Toronto, Canada, June 1998 – Abstract Review Committee; Session Chairman, Therapeutics Session and Radiopharmaceuticals VI Session

International Organizing and Program Committee, *Seventh World Congress of Nuclear Medicine and Biology*, Berlin, Germany, August 1998,

Organizer and Chairman, Symposium on Radiopharmaceuticals and Radiopharmacy, *Seventh World Congress of Nuclear Medicine and Biology*, Berlin, Germany, August 1998

1997 LMER Technical Achievement Award for Research Accomplishment (team)

Co-Editor, Special Issues of *Radiochimica Acta* (1997) and *Nuklearmedizine* (September 1998)

Co-Organizer, *Fourth International Workshop on Radioiodinated Free Fatty Acids*, Dresden, Germany, September 1998

Kocher, D. C. Member, National Council on Evaluation of EPA Guidelines for Exposure to Naturally Occurring Radioactive Materials

Member, DOE Biota Dose Assessment Committee

Member, International Atomic Energy Agency Consultant Groups–"Comparison of Methods for Calculating Health and Environmental Impacts Due to Radioactive and Non-Radioactive Agents in Waste from Electricity and Generation" and "The Use of Safety Indicators, Complementary to Dose and Risk, in the Assessment of Radioactive Waste Disposal"

Kuritz, T. Adjunct Professor, The University of Tennessee, Knoxville, Center for Environmental Biotechnology

National Research Council, National Science Foundation, and U.S. Department of Agriculture, Reviewer

Larimer, F. W. 1997 LMER Technical Achievement Award for Research Accomplishment (team)

Adjunct Faculty, University of Tennessee, Knoxville, Cell, Developmental, and Moleular Biology Program

Leggett, R. W. Elected to National Council on Radiation Protection and Measurements, 1998

NCRP Scientific Committee on Dosimetry and Metabolism of Radionuclides (SC-57), Member

	NCRP Committee on Uncertainties in Biokinetic and Dosimetric Models (SC-57-16), Member
	ICRP Task Group on Internal Dosimetry; Chairman, Subgroup on Reliability of Dose Coefficients
	ICRP Task Group on Reference Man, Member
	ICRP Task Group on Dose Calculations, Corresponding Member
	ICRP Task Group on a Dosimetric Model for the Alimentary Tract, Corresponding Member
Little, C. A.	Associate Editor, *Health Physics*
	Health Physics Society, Program Committee
	Member, Health Physics Society Standards Committee, Subcommittee on Environmental Transport Modeling
	Adjunct Professor, Department of Radiological Health Sciences, Colorado State University
	United Way Campaign Committee, Mesa County, Colorado (1997)
	Charter Member, DOE Grand Junction Office Joint Utilization Committee, 1998 (appointed by City Council)
Lu, P. Y.	Chair, American Chemical Society, Division of Chemical Health and Safety, 1999–2000
	Advisory Committee, National Health Research Institutes, Taiwan, Republic of China, 1997–2001
	Chair, Program Steering Committee, Chinese-American Academic and Professional Association in the Souteastern United States, 1997-1998
	President-Elect, American Chinese Toxciological Society, 1998
	Editorial Board, American Chemical Society's Chemical Safety and Health Division, 1998
Lyon, B. F.	International Technology Corporation Commendation for "Contributing Knowledge Among Professionals in the Technical Community," 1998
Mazur, P.	Editorial Board, *Cryobiology*
McGinn, C. W.	Chair, ORNL Risk Assessment Council
Michaud, E. J.	Adjunct Assistant Professor, University of Tennessee, Knoxville
	Member, ORNL Animal Care and Use Committee
Milanez, S.	Diplomate, American Board of Toxicology, 1997-2002
Miller, J. C.	Session Organizer and Co-Chair, *DOE Workshop on Instrumentation and Measurement Issues for Nanometer Particles*, Minneapolis, Minnesota, 1997

Symposium Organizer and Program Committee, *Thirteenth Interdisciplinary Laser Science Conference*, Long Beach, California, October 1997

Advisory Committee, *Fourth International Conference on Laser Ablation*, Asilomar, California, May 1997

Fellow, American Association for the Advancement of Science, 1998

Advisory and Program Committee, *Ninth International Conference on Resonance Ionization Spectroscopy*, Great Britain, June 1998

Program Committee, *Conference on Lasers and Electrooptics*, San Francisco, 1998

Advisory and Program Committee, *Fifth International Conference on Laser Ablation*, Gottingen, 1999

Editorial Advisory Board, *Journal of Physical Chemistry*, 1995-2000

Editorial Advisory Board, *Interactions with Materials*, 1998

Divisional Associate Editor, Laser Science, *The Physical Review Letters*, 1997-2000

Adjunct Professor, Department of Chemistry, University of Tennessee, Knoxville

Recipient, NATO International Collaboration Grant, 1997–1998

National Research Council, Committee on Atomic, Molecular, and Optical Physics, Vice-Chair

University of Tennessee Science Alliance Faculty Research Award Committee, Member

Elected Member, American Physical Society, Executive Committee for the Division of Laser Scieence

Mirzadeh, S.

American Chemical Society, Division of Nuclear Chemistry and Technology, Publications Committee (1994-97)

1997 R&D 100 Award, "Development of Modular Technetium-99m Concentrator" (with F. F. Knapp and E. D. Collins)

1997 LMER Technical Achievement Award for Research Accomplishment (team)

Member, DOE Second Biannual Workshop on "Alpha-Emitters for Medical Therapy," June 1998, Toronto, Canada

Organizer and Co-Chair, Symposium on "Chelated Metal Ions in Diagnosis and Therapy" under auspices of Divisions of Nuclear Chemistry and Technology and Inorganic Chemistry, American Chemical Society, National Meeting, Dallas, Texas, March 1998

Member, Special Study Section, National Institutes of Health

Mumby, M. E.	Certified Well Driller by NGWA
	Licensed Kentucky Monitoring Well Driller
	Registered Professional Geologist, State of Tennessee and State of Wyoming
Mural, R. J.	Organizer, *Sixth International Workshop on the Identification of Transcribed Sequences, Edinburgh, Scotland*, October 1997
	Organizer, *Seventh International Workshop on the Identification of Transcibed Sequences*, Monterey, California, November 1998
	Member, Quarterly Review Committee, Genome Database
	Member, Scientific Advisory Board, Digital Genetechnologies, Inc., La Jolla, California
	Editor, "Technical Tips Online," *Trends in Genetics*
Niyogi, S. K.	Organizing Committee, *Recent Trends in Genetic Engineering*, B.C. Guha Center for Genetic Engineering and Biotechnology, University of Calcutta, India, December 1997
Nourse, B. D.	Member, ORNL Risk Assessment Council
Oden, P. I.	1998 LMER Technical Achievement Award for Research Accomplishment (team)
	Adjunct Research Professor, Physics Department, University of Tennessee, Knoxville
	Discover Magazine Innovative Technology Award finalist for "Microcantilever Sensor Technology as Applied to Infrared Imaging" (with R. J. Warmack and T. G. Thundat)
Pearson, J.	Steering Committee, *Environmental Industry Association's Superfund Conference*, Washington, D.C., 1997
Petrov, S.	Organizing Committee, *International Conference on Intelligent Systems and Semiotech: A Learning Perspective*, Gaithersburg, Maryland, September 1997
Pinnaduwage, L. A.	Member, Review Panel for 1997 NSF/DOE Program on Partnership in Basic Plasma Science and Engineering, 1997
	ORNL/UT Collaborating Scientist, Research Associate Professor, Department of Physics, University of Tennessee, Knoxville
Richardson, W. G.	1998 LMER Technical Achievement Award for Adminstrative Support
Shinpock, S. G.	1998 LMER Technical Achievement Award for Technical Support (team)
Stevens, A.	Elected to National Academy of Sciences, 1998

Swaja, R. E.	DOE Environmental Assessment Task Group of the Risk Based Standards Working Group, Member
	ANSI Committee N13.3 on Neutron Dosimetry
	DOE Health Physics Research Award Selection Committee, Member
	ORNL Seed Money Committee, Member
Talmage, S. S.	1997 Royalty Sharing Award for "Environmentally Safe Projectiles"
Thundat, T. G.	1997 LMER Technical Achievement Award for Research Accomplishment (team)
	1998 LMER Technical Achievement Award for Research Accomplishment (team)
	Assistant Adjunct Professor, Physics Department, University of Tennessee, Knoxville
	Visiting Professor, University of Bourgundy, Dijon, France
	Discover Magazine Innovative Technology Award finalist for "Microcantilever Sensor Technology as Applied to Infrared Imaging" (with R. J. Warmack and P. I. Oden)
Triplett, L. L.	1997 LMER Operations and Support Award for Operations Support
Troxel, C. M.	Diplomate, American Board of Toxicology, 1997-2002
Uberbacher, E. C.	1997 LMER Technical Achievement Award for Research Accomplishment (team)
	Member, Genome Sequence Database Advisory Board, Santa Fe, New Mexico
	Member, Genome Database Advisory Board, Johns Hopkins
	Member, NIH Genome Program Review Committee
	Member, NIH Genome Program Functional Genomics Review Committee
	Member, DOE Human Genome Coordinating Committee
	Program Committee, *Sixth International Conference on Intelligent Systems for Molecular Biology*, Greece, 1997
	Program Committee, *Seventh International Conference on Intelligent Systems for Molecular Biology*, Toronto, 1998
	Organizing Committee and Genomics Session Organizer, *Third Pacific Symposium on Biocomputing*, 1998
	Informatics Advisory Board and Scientific Advisory Board, SmithKline Beachem
Vo-Dinh, T.	Chairman, ASTM Subcommittee on Fiberoptics
	Co-Chairman, *Conference on Biomedical Sensing, Imaging and Tracking Technologies II*, San Jose, California, February 1997

Chairman, Commission V.4 on Spectrochemical and Other Optical Procedures for Analysis, International Union of Pure and Applied Chemistry

Topical Editor, *Journal of Polycyclic Aromatic Compounds*

Associate Editor, *Analusis*

Editorial Board, *Applied Spectroscopy*

Editorial Board, *Journal of Biomedical Optics*

1998 Lockheed Martin Technology Commercialization Award (first annual recipient)

Co-Chairman, *Conference on Biomedical Sensing, Imaging and Tracking Technologies III*, San Jose, California, 1998

Warmack, R. J. 1997 LMER Technical Achivement Award for Research Accomplihsment (team)

1998 LMER Technical Achievement Award for Research Accomplishment (team)

American Museum of Science and Energy, Tennessee Technology Award for "Microcantilevers for Infrared Imaging," 1998

Discover Magazine Innovative Technology Award finalist for "Microcantilever Sensor Technology as Applied to Infrared Imaging" (with P. I. Oden and T. G. Thundat)

Wassom, J. S. Managing Editor, *Mutation Research,* 1973–97

Resource Editor, *Mutation Research*, 1998–Present

Committee Chair, Technical and Archives Committee and Member, Program and Communication Committee, Environmental Mutagen Society

Watson, A. P. Member, Army Science Board (1996–Present) and Chair of Chemical/Biological Agent Independent Assessment for the Theater Missile Defense Lethality Study (U.S. Army Space and Missile Defense Command) (1997–Present)

Member, Committee on Toxicology, Board on Environmental Studies and Toxicology, Commission on Life Sciences, National Academy of Sciences, National Research Council, 1995-Present

Member, Toxicology Review Board, U.S. Army Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, Maryland, 1992-Present

Member, Biomedical Technology Area Review and Assessment Panel, Department of Defense, Office of the Director of Defense Research and Engineering, 1997–98

Xu, Y.	1997 LMER Technical Achievement Award for Research Accomplishment (team)
	Program Committee, *1997 International Conference on Imaging Science, Technology and Systems*
	Co-Chair, Special Track on Gene Identification on Large-Scale Genomic Sequences, *Pacific Symposium on Biocomputing*, 1997
	1998 LMER Technical Achievement Award for Research Accomplishment
Young, R. A.	Councilor, Southeast Chapter Society of Toxicology
	Member, National Academy of Sciences, Committee on Toxicology, Subcommittee on Exposure Guidance Levels for Selected Hydrofluorocarbons
Yuracko, K. L.	AAAS Selection Committee for the Technology Policy Fellowship Program
	Member, ASME Risk and Life Cycle Analysis Research Committee
	ORNL Liaison to Community of Science

Advisory Committee

Dr. Charles DeLisi
College of Engineering
Boston University
44 Cummington Street
Boston, Massachusetts 02115
(Term: 1998–2000)

Dr. Lee Hood
University of Washington
School of Medicine
Department of Molecular Biotechnology, FJ20
Seattle, Washington 98195
(Term: 1998–2000)

Dr. Daniel W. McDonald
Oak Ridge National Laboratory
Instrumentation and Controls Division
Post Office Box 2008
Oak Ridge, Tennessee 37831-6005
(Term: 1998–1998)

Dr. Donald J. Reed
Director, Environmental Health Sciences Center
Oregon State University
Corvallis, Oregon 97331-7302
(Term: 1998–2000)

Dr. David A. Smith
203432 Ayoub Lane
Hagerstown, Maryland
(Term: 1998–2000)

January 4, 1999

LIFE

S. W. M

B. A.
D.

M. V. B
B

W. G. Richa

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D. M. Johnson

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P. D. Roundtr

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D. W. McPherson
S. Mirzadeh
F. Wang 5
A. L. Beets
C. C. DeLong 6

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T. J. Cochran

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D. L. Kirby OSHP
P. Shamblin IMS
C. Y. Blair
T. R. Stewart
J. Wade
J. C. Wright

Center for Independent Environmental Assessment
C. A. Little, Co-Director
R. E. Swaja, Co-Director

Center for Dosimetric Modeling and Computation
K. F. Eckerman, Co-Director
R. W. Leggett, Co-Director

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V. P. Patania*
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D. A. Rose
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J. P. Abston

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M. J. Gresalfi, Program Dev. & Recycle*
D. C. Landguth, Environ. Program Management
B. B. Clark*
D. L. Wilson, Pollutant Detection & Assessment
K. L. Yuracko, Life Cycle Analysis*

Center for Life Cycle Analysis
K. L. Yuracko, Director*
M. J. Gresalfi, Dep. Director*
C. F. Baes*
J. S. Bogard*
M. I. Morris CTD
P. B. Selby*
B. E. Tonn ED
B. B. Clark*

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J. P. Alarie
T. A. Bunde 2
Z. Chi 3
B. M. Cullum 3
G. D. Griffin
B. E. Hingerty 1
G. H. Miller*
J. Mobley 3
M. J. Sepaniak 2
D. L. Stokes 6
P. Viallet 4

MOLECULAR, CELLULAR, AND CANCER BIOLOGY
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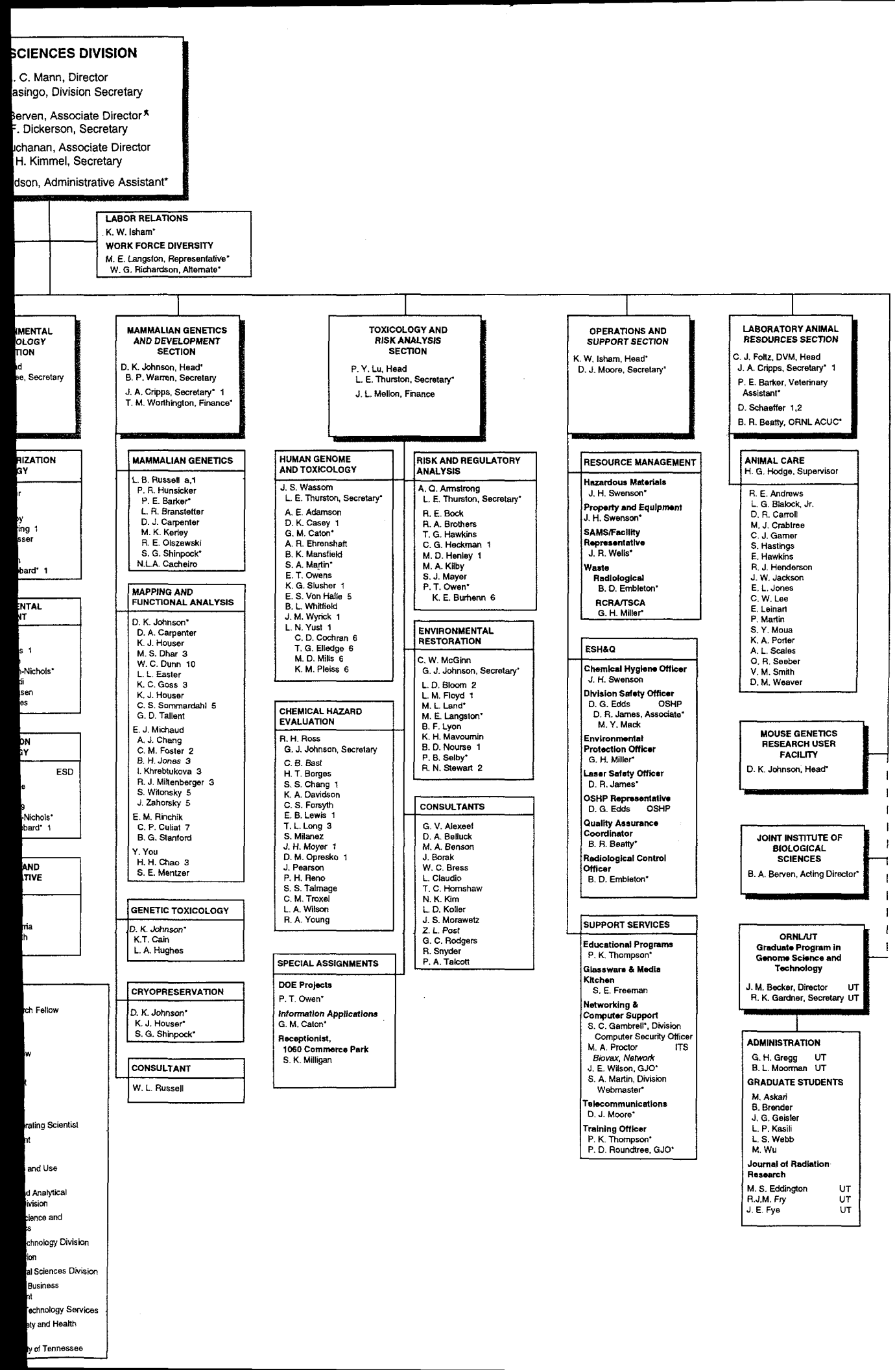
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