

Exponent®
Engineering & Scientific Consulting

William R. Jones, Ph.D.

Senior Managing Scientist | Chemical Regulation and Food Safety
Washington DC
+1-202-215-9610 | wjones@exponent.com

Professional Profile

Dr. Jones joined Exponent in 2022 following retirement from 20 years of federal government service, most recently as the Senior Science Advisor and Director of the Senior Science Advisor Staff at the U.S. Food and Drug Administration (FDA) Center for Food Safety and Applied Nutrition (CFSAN).

Prior to that, he was the Principal Deputy Director for Food Safety Science and Policy after having served as Director of CFSAN's Office of Food Safety. He started his career at FDA in 2001 as CFSAN's aquaculture expert, moving into management in his second year. His career at FDA followed previous careers in academia as a faculty member then administrator of both research and education programs and in the private sector as founder and owner of four successful businesses: an international biotechnology consulting firm; a healthcare facility; a natural food market; and an environmental biotechnology and biomolecular engineering research and manufacturing company, serving as President and as Chair of the Scientific Advisory Board prior to joining the FDA.

He has recently served as a member of the Technical Advisory Group on Food Safety for the World Health Organization (WHO); on the Water Security Bureau for the International Water Resources Association in conjunction with the United Nations Educational, Scientific and Cultural Organization (UNESCO); on the roster of advisors to the One Health High-Level Expert Panel for FAO, the World Organization for Animal Health, the United Nations Environment Programme and the WHO; on the roster of Food Standards Specialists for FAO; and as an advisor and judge for NASA's Deep Space Food Challenge to develop innovative and sustainable food systems for longer crewed missions to Mars and beyond, which includes dual-use applications for food production around the world.

Dr. Jones is a member of the Global Forum on Food Security and Nutrition of FAO, a member of WHO's Food Safety Community of Practice, a delegate to the Global Action Network on Sustainable Food from the Oceans and Inland Waters established by Norway and facilitated by FAO/WHO, and also serves on grant review panels for USAID, NOAA Sea Grant and others, and is a member of a wide variety of scientific professional organizations, including the American Association for the Advancement of Science, the American Society for Microbiology, the American Chemical Society, the Materials Research Society, the International Water Resources Association, and the International Association for Food Protection.

With training in classical genetics, field and systematic botany and vertebrate biology, as well as inorganic chemistry, organic chemistry and biochemistry before transitioning to cellular and molecular biology as well as analytical chemistry, materials science and environmental science, Dr. Jones has a broad range of experience, interests and expertise. He received a B.A. in Biology, magna cum laude, from Towson University along with French (2ND Degree) and minors in Chemistry and English. He received a Ph.D. in Cellular and Molecular Biology from the University of Maryland Graduate School at UMBC, with Dr. Richard E. Wolf, Jr. in 1990.

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He conducted post-doctoral research and served as an instructor in microbial pathogenesis with Dr. J. Glenn Morris, Jr. at the Center for Vaccine Development and Global Health, University of Maryland School of Medicine, before being appointed by President James A. Zimble in 1991 to an assistant-level faculty position at the Uniformed Services University of the Health Sciences Department of Medicine at the National Military Medical Center in Bethesda. There he directed the hepatitis E virus research and vaccine development program at the Naval Medical Research Institute, producing the initial baculovirus-based diagnostic tools and adenovirus-vectored vaccine candidates.

He then accepted an associate-level faculty appointment at the University of Maryland Biotechnology Institute, Center of Marine Biotechnology (now IMET), under Drs. Rita Colwell and Madilyn Fletcher, respectively, in 1993. He subsequently moved into an administrative role as Senior Scientist, overseeing both the Applied Microbial Ecology and the Applied Environmental Biotechnology research programs while also serving as Head of Educational Programs. He managed over $4 million of competitively awarded funding and mentored several dozen post-secondary students, graduate students and post-graduate fellows.

During his academic career, Dr. Jones presented his research internationally, lecturing at the graduate and bachelor level in Anatomy and Physiology, Bioethics, Biology, Biotechnology, Cell Biology, Environmental Science, Microbial Ecology and Molecular Pathogenesis. He is an author of over 60 scientific publications including peer-reviewed abstracts, journal articles, book chapters, review articles, handbooks and reports.

He has served as a member of the editorial board for Applied Biochemistry and Biotechnology, has reviewed manuscripts for several other scientific journals, has served on review panels of national and international research programs for the National Science Foundation, National Academy of Sciences, National Institute of Standards and Technology, USAID and others. He has delivered invited presentations and keynote addresses on every continent except Antarctica, has represented the FDA on three subcommittees of the US President's National Science and Technology Council as well as two White House policy task forces and was the U.S. Delegate to the FAO/WHO Codex Alimentarius Commission Committee on Fish and Fishery Products for over 15 years.

Academic Credentials & Professional Honors

Ph.D., Biological Sciences, University of Maryland, Baltimore, 1990

B.A., Biology and French, Towson University, 1982

As an entrepreneur, Dr. Jones has received multiple Distinguished Achievement Awards and, as an academic, has been recognized with a Distinguished Alumni Award from his undergraduate institution, a Distinguished Service Award during his first faculty appointment and a Visionary Scientist attribution during his second faculty appointment, as well as an Outstanding Adjunct Faculty Award and the Outstanding Young Scientist Nomination from the Maryland Academy of Sciences.

From among over 40 professional honors, more recently, in 2017 Dr. Jones received the FDA Commissioner's Award of Excellence, in 2018 he was awarded the FDA Commissioner's Special Citation, and in 2019 in addition to a US EPA Bronze Medal "for outstanding contributions to environmental protection programs of national scope," the William R. Jones Cultural Legacy Award was established in his honor at FDA. In 2020, he received the Commissioner's Special Citation "for outstanding and meritorious service" to Codex, a flag flown over the US Capitol in his honor as an "unsung hero" in the response to the COVID-19 pandemic, and the Outstanding Customer Service Award. In 2021, he received two different Commissioner's Special Citations as well as a Commissioner's Group Recognition Award, a Diversity, Equity and Inclusion Award, and the FDA Commissioner's Distinguished Career Service Award.

Academic Appointments

Concurrent Faculty Appointments

Graduate Faculty, Marine and Estuarine Environmental Sciences, Univ. of MD, 1997-2003

Adjunct Graduate Faculty, Graduate School, Univ. of MD, 1997-2003

Biotech. Faculty, NSF Young Scholars Program, Notre Dame of Maryland University, 1994-1995

Adjunct Faculty, Biology, Community College of Baltimore County, 1993-1997

Research Assistant Professor, Dept. of Medicine, Uniformed Services University of the Health Sciences, Walter Reed National Military Medical Center, 1992 1994

Publications

Representative publications include:

Jones, W. R. Water Resource Prospects for the Future: Personal Perspectives on a Shared History from Earth Day, the Fourth Industrial Revolution and One Health to the Futures of Alternative Energy, Bioconvergence and Quantum Computing. Water International 2021; 46:7-8, 1158-1186. https://doi.org/10.1080/02508060.2021.2005332

Hoskin, G., W. Jones. Enhancing Human Health. In S. Walker (ed.), Charting the Course for Ocean Science in the US for the Next Decade, NSTC/The White House Joint Subcommittee on Ocean Science and Technology 2007; p.39-44.

Pritchard, H., J. Jones-Meehan, C. Nestler, L.D. Hansen, W. Straube, W. Jones, J. Hind and J.W. Talley. Polycyclic aromatic hydrocarbons (PAHs): improved land treatment with bioaugmentation. In J.W. Talley (ed.), Bioremediation of Recalcitrant Compounds, CRC Press 2006; p.215-300.

Hoskin, G., W. Jones, B. Podoski and L. Bluhm. Hazard Analysis and Critical Control Point (HACCP) Systems. In M. Miliotis and J. Bier (eds.), International Handbook of Foodborne Pathogens, Marcell Dekker 2003; p.815-824.

Jones, W. R. Prospects for Pollution Reduction by Bioremediation in the Marine Environment. In E. Mann Borgese, A. Chircop and M. McConnell (eds.), Ocean Yearbook, U. Chicago Press 2002; p.463-471. https://doi.org/10.1163/221160002X00259

Ewell, M., J.S. Hind, J. Jones-Meehan and W.R. Jones. Characterizing the role of bacteria and bacterial activities in the emulsification and degradation of triglycerides. In M. Healy, D.L. Wise and M. Moo-Young (eds.), Environmental Monitoring and Biodiagnostics of Hazardous Contaminants, Springer, Dordrecht 2001; p.41-54. https://doi.org/10.1007/978-94-017-1445-7_4

Broedel, S. E., S. M. Papciak, and W. R. Jones. The selection of optimum media formulations for improved expression of recombinant proteins in E. coli. Athena Enzyme Systems Technical Bulletin 2001; 2(1).

Frederick, J.A., D. Jacobs and W.R. Jones. Biofilms and biodiversity: an interactive exploration of aquatic microbial biotechnology & ecology. Journal of Industrial Microbiology and Biotechnolology 2000; 24:334-338. https://doi.org/10.1038/sj.jim.2900827

Straube, W. L., J. Jones-Meehan, P. H. Pritchard and W. R. Jones. Bench-scale optimization of bioaugmentation strategies for treatment of soils contaminated with high molecular weight polyaromatic hydrocarbons. Resources, Conservation and Recycling 1999; 27(1-2): 27-37. https://doi.org/10.1016/S0921-3449(98)00083-4

Jones, W.R. Les éboueurs de la mer. Biofutur 1998; 179:70-73. https://doi.org/10.1016/S0294-3506(98)80148-8

Jones, W.R. Overview of mitigation options and bioremediation techniques. In T. H. Russ, R. V. Percival, B. A. Fowler and W. R. Jones (eds.), Brownfields redevelopment: Risk assessment and environmental biotechnology workshop. Athena Environmental Sciences, 1998.

Jones, W.R. Practical applications of marine bioremediation. In Colwell, R. (ed.), Current Opinion in Biotechnology 1998; 9(3): 300-304. https://doi.org/10.1016/S0958-1669(98)80063-3

Hind, J.S., J. Jones-Meehan, M. Beard, K. Pelovitz, E. Shinkman and W.R. Jones. Bench-scale investigations of the effects of biosurfactants on the bioavailability of hydrocarbon contaminants. In D. L. Wise (ed.), Global Environmental Biotechnology, Springer, Dordrecht 1997; 377-387. https://doi.org/10.1007/978-94-017-1711-3_33

Jones, W.R. Biosurfactants, bioavailability and bioremediation. In Wise, D.L. (ed.), Studies in Environmental Science 1997; 66: 379-391. https://doi.org/10.1016/S0166-1116(97)80057-X

Jones, W. R., J. S. Hind, J. Jones-Meehan and M. Walch. Microbial treatment for shipboard collection, holding and transfer system tanks. Proceedings of the Joint Army-Navy-NASA-Air Force Safety & Environmental Protection Subcommittee 1994; 611:175-183.

Jones, W. R., M. Walch and J. Jones-Meehan. Biodegradation of polymer coatings. Proceedings of the Materials Research Society 1994; 344:197-202.

Jones, W. R., G. J. Barcak and R. E. Wolf, Jr. Altered growth rate-dependent regulation of 6-phosphogluconate dehydrogenase level in hisT mutants of Salmonella typhimurium and Escherichia coli. J. Bacteriol. 1990; 172(3): 1197-1205. https://doi.org/10.1128/jb.172.3.1197-1205.1990

Siegel, D., W. R. Jones and J. M. Sherrill. A mandatory freshman advising program in a university of 9,000 undergraduate students. Resources in Education 1983; May: 19 p; ERIC NO: ED237821. https://eric.ed.gov/?id=ED237821

Representative presentations include:

W.R. Jones. Food Products Incorporating Cultured Animal Cells: Regulatory Perspectives. Institute for Food Safety and Health Annual Meeting, Bedford Park, IL. September 2019.

W.R. Jones. Overview of Recent FDA Investigations to Mitigate Chemical and Biological Hazards in Fluid. 1st International Fluids and Health Conference, Cargèse, France. July 2019.

W.R. Jones. How Research is Used to Inform Guidelines, 1st International Fluids and Health Conference, Cargèse, France. July 2019.

W.R. Jones. Current FDA Regulatory Safety Frameworks for Foods and Products of Cell Culture Technology. USDA/FDA Joint Public Meeting, Washington, DC. October 2018 (https://www.youtube.com/watch?v=COD4jl8YaMQ @55:00)

W.R. Jones. FDA Agency Report. Conference for Food Protection, Richmond, VA. April 2018.

W.R. Jones. Statement of William R. Jones, Ph.D., Deputy Director, Office of Food Safety, Center for Food Safety and Applied Nutrition, USFDA. United States Congress, House of Representatives. House Energy & Commerce Committee, Health Subcommittee. Hearing on Waste and Duplication in the USDA Catfish Inspection Program, 114th Congress 2nd session, Washington, DC. December 7, 2016 (https://www.youtube.com/watch?v=cSY_xKIX7PY&feature=youtu.be @ 57:00)

Randolph, S. and W.R. Jones. Update on the Seafood List, FDA's Policy for Determining if a Name is an Acceptable Market Name and Reported Species Substitution Cases. Pacific Fisheries Technologists Conference, San Francisco, CA. February 2008.

Jensen, G.L., K.J. Greenlees and W.R. Jones. Evolution of programs and current issues associated with the safety, quality and labeling of farm-raised aquatic foods in the United States. Asian-Pacific Aquaculture Conference, Bangkok, Thailand. September 2003.

W.R. Jones and B. Koonse. Good Aquaculture Practices and Food Safety. Aquaculture America National Conference, San Diego, CA. January 2002.

W.R. Jones. Probiotic Biofilms, Biosurfactants. Institute for Defense Analysis, Alexandria, VA. June 2001.

W.R. Jones. Biosurfactants: Research and Applications. NSF Industry/University Center for Biosurfaces Green Approaches Workshop, Niagara Falls, NY. September 2000.

W.R. Jones. Biofilms and Biodiversity in Aquatic Environments, Research Laboratories and Educational Programs. National Science Foundation, Alexandria, VA. July 2000.

Frederick, A., D. Jacobs and W.R. Jones. Biofilms and biodiversity: an interactive exploration into microbiology, ecology, and biotechnology. Annual Conference of the National Marine Educators Association, Long Beach, CA. July 2000.

W.R. Jones. Development of a luminescent bacterial biosensor for deep ocean pollution monitoring. International Society for Environmental Biotechnology, Kyoto, Japan. July 2000.

Jones, W.R. Sludge-busters: using microbes to clean up the environment. Smithsonian Associates, Smithsonian Institution, Washington D.C. April 1999.

Jones, W.R. The virtues of VIRTUE, the Virtual University Education Program. Taped for "Maryland State of Mind," Maryland Public Television, Baltimore, MD. March 1999.

Frederick, A., and W.R. Jones. Field to flask: biofilms and biodiversity. Annual Meeting of the National Marine Educators Association, Humacao, Puerto Rico. August 1998.

Straube, W.L., J. Jones-Meehan, P. H. Pritchard, and W. R. Jones. Bench-scale optimization of bioaugmentation strategies for treatment of soils contaminated with high molecular weight polyaromatic hydrocarbons (HMW PAHs). International Society for Environmental Biotechnology, Belfast, NIR. May 1998.

M. Ewell, J. S. Hind, and W. R. Jones. Characterizing the role of bacteria and bacterial components in the removal of triglycerides. International Society for Environmental Biotechnology, Belfast, NIR. May 1998.

Jones, W.R. Biosensors and bioremediation in the marine environment. Annual Sigma Xi Keynote Lecture, Towson University, Baltimore, MD. May 1998.

Jiang, S., W. Straube, J. Jones-Meehan and W. R. Jones. Development of a luminescent bacterial biosensor for pollution monitoring in the deep sea environment. Annual Meeting of the American Society for Microbiology, Atlanta, GA. May 1998.

Brown, J., and W.R. Jones. Sludge-busters: using microbes to clean up the environment. In Microbe Mondays lecture and workshop series, Pfizer World Headquarters, N.Y., N.Y. March 1998.

Jones, W.R., and J.S. Hind. Prototyping biosurfactant application for waste stream reduction in the automated manufacture of athletic shoes. Nike Headquarters, Beaverton, OR. November 1997.

Jones, W.R., J. Krauk, and K. Gloersen. Crabmeat forensics: Is it true blue? Annual Northeast Seafood Seminar, Ocean City, MD. November 1997.

Jones, W.R., and J. Brown. Light up your science center. Association of Science and Technology Centers Annual Conference, St. Louis, MI. October 1997.

Jones, W.R., S. Jiang, W. Straube, and J. Jones-Meehan. Prototyping a bioluminescent bacterial biosensor for monitoring and quantifying biologically active pollutants in the deep sea. Dept. of Defense Deep Ocean Relocation Program Meeting, Naval Research Lab, Stennis Space Center, MS. August 1997.

Jones, W.R. Biosensors, biosignals, biosignatures, and biosurfactants. Defense Advanced Research Programs Administration, Alexandria, VA. July 1997.

Jones, W.R. Career opportunities in biotechnology. Taped for “Baltimore at Work,” Fox 45. June 1997.

Jones, W.R., S. Jiang, W. Straube, and J. Jones-Meehan. Characterizing the response of a bioluminescent bacterial biosensor to heavy metals and hydrocarbon contaminants. Department of Defense Deep Ocean Relocation Program Meeting, NRL, Stennis Space Center, MS. May 1997.

Jones, W.R. Biosurfactants, bioavailability and bioremediation. Session Chair Keynote Address, International Society for Environmental Biotechnology, Boston, MA, July 1996.

Hind, J.S., J. Jones-Meehan, M. Beard, M. Walch, E. Shinkman and W.R. Jones. Bench-scale investigations of the effects of biosurfactants on the bioavailability of hydrocarbon contaminants. International Society for Environmental Biotechnology, Boston, MA. July 1996.

Jones, W.R. Bread, beets, babies, bad guys, biotechnology and the Chesapeake Bay. AAAS live interactive video lecture, Ann. Mtg. and Innovation Exposition, Public Science Day, Baltimore, MD. February 1996.

Jones, W.R. Microbial products for degreasing applications. The Clorox Company Technical Center, Pleasanton, CA. June 1995.

Jones-Meehan, J., M. Beard, J. Hind and Jones, W.R. Microbial products for cleaning Navy equipment. Technology Transfer Symposium, Los Angeles, CA. October 1994.

Jones-Meehan, J., M. Beard, J. Hind and W.R. Jones. Probiotic microbial additives for shipboard CHT system tanks. PERA CV Program Review, Naval Academy, Annapolis, MD. September 1994.

Jones, W.R., M. Walch and J. Jones-Meehan. Biodegradation of polymer coatings. Spring Meeting of the Materials Research Society, San Francisco, CA. April 1994.

Jones, W.R. Biotechnology, the fourth great industrial revolution. The Governor's Academy Program for Science Teachers, Baltimore, MD. July 1994.

Jones, W.R. Altered growth rate dependent regulation of gnd expression in hisT and miaA mutants of S. typhimurium and E. coli: RNA stem loop bonding, stabilization, the ‘parallellarap’ and implications for a

global regulatory circuit for protein synthesis and central metabolism. Annual Meeting of the American Society for Microbiology, New Orleans, LA. May 1989.

Additional Education & Training

Developing and Implementing an Outward Mindset (Arbinger Inst.), FDA, 2021.

Leadership Dialogues on Diversity, Equity & Inclusion, FDA, 2021.

Classified National Security Information Training, FDA, 2020.

High Threat Security Overseas, Department of State, 2018.

Counterintelligence Awareness, FDA, 2017.

Leadership for a Democratic Society, Federal Executive Institute, 2012.

Higher Performing Organization Development Training, FDA, 2008.

Bioterrorism Legislation, Rules and Procedures, FDA, 2003.

Import Operations, FDA, 2003.

Regulatory Development, FDA, 2002.

Food and Drug Law, FDA, 2002.

Food Safety Risk Communication, JIFSAN, 2002.

Food Safety Risk Assessment, JIFSAN, 2002.

Seafood HACCP, AFDO Seafood HACCP Alliance, 2001.

Introduction to Risk Management, FDA, 2001.

Editorships & Editorial Review Boards

Applied Biochemistry and Biotechnology Editorial Board, 1997-2001.

Research Grants

2000-2002 Naval Research Laboratory, “Research in Detection, Treatment, and Reduction of Hazardous Materials.” FY2000, $300,000; FY2001, $315,000; FY2002, $330,750.

1998-2000 Wallenberg Foundation, “Microbial Processes and Regulation of Biofilm Formation.” Co-PI: Paul Dunlap. FY98-FY00, $100,000.

1997-1999 Naval Surface Warfare Center, “Research in Biocorrosion, Biofouling, Environmental Biotechnology, Biomarine Engineering and Biosensors.” Co-PI: John Hind. FY1997, $260,184; FY1998, $361,756; FY1999, $376,102.

1996-1998 Nike, “Bench Scale Optimization of the High Through-Put Cleaning of Plastic Parts by Aerosol Application of Biosurfactants.” FY1996, $92,000; FY1997, $120,000, FY1998, $150,000.

1994-1998 Strategic Environmental Research and Development Program, "Surfactant-Enhanced Biodegradation of Contaminants." Co-PI: Joanne Jones-Meehan. FY1994, $73,000; FY1995, $70,000; FY1996, $60,000; FY1997, $117,000, FY1998, $150,000.

1997 Naval Research Laboratory, “Modeling Microbial Biosensors for Deep Ocean Monitoring of Potential Pollutants.” With Post-Doctoral Fellow Will Straube. FY1997, $130,000.

1995-1997 The Clorox Company, "In Situ Methods for Assessing the Activity of Biological Drain Cleaners." FY1995, $67,000; FY1996, $60,000; FY1997, $35,000.

1996 Northeast Consortium for Engineering Education, “Over-expression of the plasmid-encoded bop gene” With Madilyn Fletcher. FY1996, $59,081

1994-1996 Strategic Environmental Research and Development Program, “Integrated Biotreatment Research Program.” With J. Jones-Meehan. FY94, $90,000; FY95, $90,000; FY96, $90,000.

1994-1995 Naval Surface Warfare Center. “Evaluation of Microbial Degradation of Heavy Hydrocarbons and Energetic Materials.” With J. Jones-Meehan. FY1994, $31,000; FY1995, $25,000.

1994 Naval Surface Warfare Center, “Bioremediation, Biofouling and Biocorrosion.” FY94, $187,000.

1993-1996 NAVSEADET (PERA CV), "Microbiological Additives for Shipboard Collection, Holding and Transfer System Tanks." FY93, $24,000; '94, $24,000; '95, $9,000; '96, $5,000.

1993-1995 Naval Surface Warfare Center, "In Situ Cleaning of Shipboard Oil/Water Separators." With J. Hind. FY1993, $100,000; FY1994, $110,000; FY1995, $20,000.

Peer Reviews

Global Water Security Issues Series, UNESCO, 2021.

Grant Proposal, Maryland Sea Grant College, 2021.

Global Water Security Issues Series, UNESCO, 2020.

Driving American Rural Prosperity Through Agricultural Policies, NSTC/The White House, 2019.

Panel Chair, Middle East Regional Cooperation Program (MERC), USAID, 2017.

Research Proposals, Florida Sea Grant College, 2011, 2013.

Research Proposals, MERC, USAID/NAS, 2010-pres.

Microbiological Risk Assessment, USDA, 2009.

Microbiological Risk Assessment, FDA, 2008.

Microbiological Risk Assessment, FAO/WHO, 2007.

Manuscript, Food Control, 2005.

Manuscript, Journal of Agricultural and Food Chemistry, 2004.

Manuscript, Journal of the American Dietetic Association, 2004.

Research Proposals, Advanced Technology Program, NIST, 2003-2005.

Research Proposals, Wisconsin Sea Grant Institute, 2003.

Manuscript, Virginia Journal of Science, 2002.

Abstracts, International Society for Environmental Biotechnology, 2002.

Program Proposal, CCBC Environmental Science Program, 2001.

Research Proposals, Biosystems Technology Program, USDA, 2000.

Program Proposals, Major Research Instrumentation Program, NSF, 2000.

Research Proposals, R&D Collaborative Grant Program, South Dakota, 1999.

Research Proposals, SBIR Programs, NSF, 1999.

Research Proposals, CDR/MERC Program, USAID/NAS, 1998-2010.

Biological Safety Reviews, US Naval Research Laboratory, 1998-2001.

Invention Disclosures, Univ. of MD Biotechnology Institute, 1998-2000.

Research Proposals, Florida Sea Grant College, 1997-2001.

Post-Doctoral Fellowship Applicants, Naval Research Laboratory, 1997-2000.

Session Chair, International Soc. for Environmental Biotechnology, 1996-1998

Manuscripts, Microbial Ecology, 1995.

Research Proposals, R&D Program, State of Louisiana, 1994-1995.

SBIR Proposals, USEPA and Office of Naval Research, 1993-1994.

Research Proposals, American Institute of Biological Sciences, 1992-1993.

Hubble Space Telescope Technical Manuals, Space Telescope Science Institute, Johns Hopkins University, 1981-1982.