

## CEC Expert Panel Member Biographies

### HUMAN HEALTH TOXICOLOGIST

#### **Dr. Paul Anderson**

Vice President and Principal Scientist

ARCADIS US, Inc.

2 Executive Drive, Suite 303, Chelmsford, MA 01824

Phone: 978-937-9999 x304

Email: [paul.anderson@arcadis-us.com](mailto:paul.anderson@arcadis-us.com)

#### Education:

Postdoctoral Fellowship, Harvard School of Public Health, Interdisciplinary Programs in Health

Postdoctoral Fellowship, Harvard University, Biology Department

Ph.D., Biology, Harvard University

M.A., Biology, Harvard University

B.A., Biology, Boston University

Dr. Anderson has over 20 years of experience in human health and ecological risk assessment. Since 2000, Dr. Anderson has led several research efforts investigating the potential presence and effects of active pharmaceutical ingredients (APIs) and personal care products in surface water as well as other environmental media. His research in the area of constituents of emerging concern (CECs) began with the development of a screening level model (the Pharmaceutical Assessment and Transport Evaluation (or *PhATE*<sup>™</sup>) model) that predicts the concentration in surface water of human-use pharmaceuticals and other compounds released from sewage treatment plants across the United States (including the Sacramento and Lower Colorado Rivers). The model has since been corroborated and was published in *Environmental Science and Technology* in 2004. Additionally, Dr. Anderson helped develop and continues to oversee the use of a database that summarizes the English language peer-reviewed literature on aquatic toxicity, environmental fate in surface water and treatment plant removal of pharmaceuticals. The database is designed to make all historical information easily accessible to users as well as providing them with up-to-date information. Dr. Anderson and his colleagues have used these tools to conduct several evaluations, including an assessment of the potential human health effects of several therapeutic classes of pharmaceuticals in US surface waters; the development of a predicted no effect concentration for protection of aquatic receptors from ethinyl estradiol (EE2); a comparison of predicted to measured concentrations of EE2 in surface water to establish the range of likely EE2 concentrations (submitted for publication); an evaluation of the potential for estrogens (both prescribed and naturally occurring) in drinking water to pose a potential risk to humans in the United States (submitted for publication); and characterization of the potential ecological risk associated with EE2 in surface water (manuscript in preparation). More recently, Dr. Anderson has expanded his research in the area of trace compounds in surface waters to include two comprehensive reviews of existing

information and ongoing research efforts. The first was a review of the state-of-the-science of endocrine disrupting compounds (EDCs) and the implications of the presence of such compounds for wastewater treatment, published by the Water Environment Research Foundation in 2005. It described the sources of EDCs in wastewater, their fate in wastewater treatment plants, and impacts in the environment as a result of discharges. The second project, published in 2008, updated and expanded the 2005 work on EDCs to include the full range of organic compounds that may occur at trace levels in wastewater treatment plant effluents. The research included: a review of the different sources and categories of trace organic compounds; how they are measured; their removal in treatment plants; an introduction to the potential ecological and human health effects associated with trace organics in treated wastewater, recycled water, and receiving streams; and an overview of current research needs including a summary of web-links describing major current research initiatives. Dr. Anderson is also an adjunct professor in the Center for Energy and Environmental Studies within Boston University's Geography Department.

### **ENVIRONMENTAL TOXICOLOGIST**

#### **Dr. Daniel Schlenk**

Professor

Department of Environmental Sciences

University of California, Riverside, CA 92521

Phone: 951-827-2018

Email: [daniel.schlenk@ucr.edu](mailto:daniel.schlenk@ucr.edu)

#### Education:

Postdoctoral Fellow, Duke University

Ph.D., Biochemical Toxicology, Oregon State University

B.S., Toxicology, Northeast Louisiana University

The overall focus of Dr. Schlenk's laboratory has been to evaluate mechanisms of action of chemicals in aquatic and marine organisms. For the past 15 years, Dr. Schlenk has been interested in the estrogenic effects of legacy and emerging chemicals of concern. Initial work began with exploring the stereoselective biotransformation and activation of the legacy contaminant, methoxychlor. His lab helped develop a method to measure the egg yolk protein, vitellogenin in channel catfish and Japanese medaka. This metric was used to evaluate estrogenic activity in wastewater treatment plants in the south and east coasts and waterways of the United States. From there, his laboratory evaluated the effects of  $\beta$ -adrenergic antagonists and other pharmaceutical agents on aquatic fish and invertebrates. Dr. Schlenk's research in California has focused on the impacts of feminization on marine fish reproduction and populations as well as the identification of causal agents in sediments and water receiving oceanic discharge from municipal wastewater treatment facilities, particularly off the coast of Orange County. In addition, his laboratory conducted studies evaluating the long-term effects of

recycled water on fish health. Current studies are underway to identify unknown estrogenic compounds in surface waters of the Central Valley and Santa Ana River. Specific agents that have been examined include current use pesticides (such as pyrethroids and herbicides), surfactants and UV-sunscreen agents. It is his goal to understand the modes of action of these compounds alone and in mixtures to determine the interactive roles each may have in endocrine disruption. In 2008, Dr. Schlenk served on the USEPA Science Advisory Board to evaluate potential changes to the Aquatic Life Criteria for Compounds of Emerging Concern. From 2003-2006, he was a member of the Board of Directors for the North American Society of Environmental Toxicology and Chemistry. He is the co-Editor-in Chief of *Aquatic Toxicology* and serves on the editorial boards of *Toxicological Sciences*, *The Asian Journal of Ecotoxicology* and *Marine Environmental Research*. He has been a permanent member of the USEPA FIFRA Science Advisory Panel since 2007, and has participated in proposal review panels for the USEPA, NOAA, and the National Institute of Environmental Health Sciences.

#### **EPIDEMIOLOGIST/RISK ASSESSOR**

##### **Dr. Adam Olivieri, P.E.**

Vice President

EOA, Inc.

1410 Jackson Street, Oakland, CA 94612

Phone: 510- 832-2852 ext.115

Email: [awo@eoainc.com](mailto:awo@eoainc.com)

##### Education:

Postdoctoral Fellow, School of Public Health, University of California, Berkeley

Dr. P.H., University of California, Berkeley

M.P.H., University of California, Berkeley

M.S., Civil and Sanitary Engineering, University of Connecticut

B.S., Civil Engineering, University of Connecticut

Dr. Olivieri has over 30 years of experience in the technical and regulatory aspects of water recycling, groundwater contamination by hazardous materials, water quality and public health risk assessments, water quality planning, wastewater facility planning, urban runoff management, and on-site waste treatment systems. He is a Registered Civil Engineer and a Registered Environmental Assessor with the State of California. Dr. Olivieri has extensive experience in the area of microbial risk assessment and the application of such models to make engineering and public policy decisions. Recently he served as Principal Investigator on the development of a user friendly microbial risk assessment tool (MRAIT) for the Water Environment Research Foundation. Dr. Olivieri served as the co-project director at the Public Health Institute/Western Consortium for Public Health, where he directed the City of San Diego's Health

Effects Studies at Mission Valley and San Pasqual, investigating the health risks of potable reuse of recycled San Diego municipal wastewater. The overall research plan was developed to address the fundamental issues raised by the 1982 National Research Council, and consistent with their recommendations involved a comprehensive investigation and comparison of both a recycled and a current potable water supply. The research project involved developing research plans and managing research across a wide base of California's prestigious universities including Berkeley, Davis, Los Angeles, San Francisco, and Scripps (San Diego), San Diego State University and several laboratories of the California Department of Public Health Services. The project involved research in the following major areas: a) Infectious Disease Agents – pathogenic viruses, parasites, and bacteria (including indicator organisms), b) Chemical Screening – volatile and semi-volatile organics, metals, PCBs, dioxins, TOC, and TOX, c) Genetic Toxicity Bioassay – Ames Assay, Micronucleus tests, 6-Thioguanine Resistance Assay, and Cellular Transformation Assay, d) Fish Biomonitoring, e) Plant Reliability – performance and mechanical reliability analysis and chemical and microbial agent unit and plant spiking studies, f) Chemical Risk Assessment – carcinogenic and non-carcinogenic, g) Epidemiology – baseline information (reproductive outcomes, vital statistics, and neural tube defects), and h) a Long-Term Health Effects Monitoring Plan. The San Diego Health Effects investigations have been recognized by the Science Advisory Board and a special publication by the Water Environment Federation and the American Water Works Association covering the use of recycled water to augment potable water resources. The San Diego Health Effects investigations have also been recognized and used by the Australian government and the University of New South Wales in the development of water reuse guidelines. Dr. Olivieri has and continues to serve on a number of national technical review panels. Currently he serves on two National Water Research Institute technical review panels, one for Orange County (CA) evaluating the alternative disinfection options for the wastewater treatment plant along with potential public health implications related to recreation exposure. The second is for Monterey County (CA), which is evaluating groundwater recharge using recycled water. At the request of the USHouse of Representatives – Subcommittee on Water Resources and Environment, he provided testimony on April 13, 2005 on microbial agents and risk assessment relative to the national wastewater blending issue.

## **BIOCHEMIST**

### **Dr. Nancy Denslow**

Professor

Dept. of Physiological Sciences and Center for Environmental and Human Toxicology

University of Florida, Gainesville, FL 32611

phone: 352-294-4642

email: [ndenslow@ufl.edu](mailto:ndenslow@ufl.edu)

Education:

Postdoctoral Fellow, University of Florida

Ph.D., Biochemistry and Molecular Biology, University of Florida

M.S., Biochemistry and Molecular Biology, Yale University

B.S., Chemistry, Mary Washington College

Dr. Denslow's research involves environmental toxicology with a special focus on endocrine disruptors and pharmaceuticals in the environment. Her interests include defining molecular mechanisms of action

of endocrine disrupting chemicals that adversely affect reproduction in fish that are exposed to the contaminants in surface waters. Her research covers both sex hormone receptor mediated and independent mechanisms. Favorite model systems include largemouth bass, fathead minnow, sheepshead minnow and zebrafish. Common research tools include traditional toxicology assays, biochemical pathways, histopathology, microarrays, real time PCR, proteomics, tissue culture based assays, transfections and in vivo determination of reproductive endpoints. In addition, Dr. Denslow has initiated research to understand the effect of nanomaterials on fish health. These experiments are integrated to look at gill function, histopathology, nanomaterial uptake and nanomaterial characterization. In addition, microarrays and proteomics tools are used to characterize the effects of the exposures. She has published more than 120 peer-reviewed publications and has led research projects supported by NIH/NIEHS, NSF, USEPA, and the USArmy Corps of Engineers. Dr. Denslow also serves as Associate Editor for *Comparative Biochemistry and Physiology Part D Toxicogenomics and Ecotoxicology and Environmental Safety*, and received the Pfizer Award for Research Excellence in 2007 and a UFRF professor designation for 2009-2012. Dr. Denslow previously served for 15 years as the Director of the Protein Chemistry and Molecular Biomarkers Core Facility at the University of Florida. She has served on the Executive Board of the Association for Biomolecular Research Facilities (ABRF) and is a member of the Society of Environmental Toxicology and Chemistry (SETAC) and the Society of Toxicology (SOT) serving as senior councilor in the Molecular Biology Specialty Section. She is also a member of the American Association for Biochemistry and Molecular Biology (ASBMB).

#### **CIVIL ENGINEER FAMILIAR WITH THE DESIGN AND CONSTRUCTION OF RECYCLED WATER TREATMENT FACILITIES**

##### **Prof. Dr.-Ing. Jörg E. Drewes (*Panel Chair*)**

Chair of Urban Water Systems Engineering

Technical University of Munich

Am Coulombwall 3

85748 Garching, Germany

Phone: 303-884-9746

E-mail: [jdrewes@tum.de](mailto:jdrewes@tum.de)

Education:

Postdoctoral Fellow, Arizona State University

Ph.D., Environmental Engineering, Technical University of Berlin, Germany

Dipl. Ing., Environmental Engineering, Technical University of Berlin, Germany

Dr. Drewes has been actively involved in research in the area of water treatment and non-potable and potable water reuse for more than 18 years. For the last 14 years, Dr. Drewes has been conducting research on indirect potable reuse projects in the State of California, including surface spreading as well as direct injection projects. The main focus of these studies has been the fate and transport of trace organic chemicals in these systems. He has led research as the principal investigator (PI) or Co-PI to better understand the rejection of trace organic chemicals during high-pressure membrane treatment

(nanofiltration, reverse osmosis) as well as the fate and transport of micropollutants in soil-aquifer treatment systems. A common theme in all these projects was to identify meaningful trace organic compounds that can serve as indicator compounds for system performance assessments. He has also conducted tailored studies to further develop this concept for multiple treatment processes commonly employed in indirect potable reuse followed by more focused efforts for surface spreading and direct injection projects. This indicator concept has been adopted in the Australian Water Recycling Guidelines for Drinking Water Augmentation in 2008. In addition, he has been involved in several studies addressing the occurrence of emerging contaminants in recycled water and to provide guidance to the water industry regarding occurrence, fate and transport, health effects, analytical methods and communication. Dr. Drewes research group is currently working on developing more predictive tools for the fate of trace organic chemicals in various reuse schemes using quantitative structural property relationships (QSPRs) coupled with process models. Dr. Drewes has published more than 160 journal papers, book contributions, and conference proceedings. He was awarded the 2007 AWWA Rocky Mountain Section Outstanding Research Award, the 2003 Dr. Nevis Cook Excellent in Teaching Award, the Quentin Mees Research Award in 1999, and the Willy-Hager Award in 1997. In 2008, he was appointed to the National Research Council Committee on Water Reuse as an Approach for Meeting Future Water Supply Needs. Since 2007, Dr. Drewes has held an Adjunct Professor appointment at the University of New South Wales, Sydney, Australia.

**CHEMIST FAMILIAR WITH THE DESIGN AND OPERATION OF ADVANCED LABORATORY METHODS FOR THE DETECTION OF EMERGING CONSTITUENTS**

**Dr. Shane Snyder**

Professor and Co-Director  
Chemical and Environmental Engineering  
Arizona Laboratory for Emerging Contaminants (ALEC)  
University of Arizona, Tucson, AZ USA  
Telephone: (520) 621-2573  
Email: [Snyders2@email.arizona.edu](mailto:Snyders2@email.arizona.edu)

Education:

Ph.D., Zoology and Environmental Toxicology, Michigan State University  
B.A., Chemistry, Thiel College

Dr. Shane Snyder is the co-founder and vice president of Total Environmental Solutions Inc (TES). TES was founded in 1999 as a solutions-based company offering consulting and laboratory services to a diversity of government, municipal, and private sector clients. Dr. Snyder also served as the R&D Project Manager for the Southern Nevada Water Authority (SNWA) for over a decade. He has published more than 90 manuscripts on the occurrence and fate of emerging contaminants in water. In 1998, he was credited with the first discovery of natural and synthetic estrogens in North American waters. Dr. Snyder also linked the occurrence of steroids in wastewater to potential endocrine impacts in fish in the late 1990's. In 2002, he was awarded one of the most comprehensive studies investigating the efficacy of conventional and advanced water treatment processes for the removal of endocrine disruptors and

pharmaceuticals (AwwaRF 2758). Dr. Snyder serves as an Associate Adjunct Professor of Chemistry at the University of Nevada, Las Vegas. He has served two terms on the USEPA Federal Advisory Committee for the Endocrine Disruptor Screening Program and has served on two expert panels for USEPA's Candidate Contaminant List III. He is a member of the Research Advisory Council for the WaterReuse Foundation and is a member of the American Water Works Association's Water Science & Research Division Board of Trustees. Dr. Snyder was one of six experts to testify before the US Senate regarding pharmaceuticals in US waters in April of 2008. In 2009, Dr. Snyder's research team published the first national survey of pharmaceuticals in US drinking water. Beginning in 2010, Dr. Snyder has accepted the position of Professor of Chemical and Environmental Engineering at the University of Arizona. He is also the Co-Director of the Arizona Laboratory for Emerging Contaminants at the University of Arizona.

#### SCIENTIST/ENGINEER FAMILIAR WITH THE ORIGINS, FATES AND RISKS ASSOCIATED WITH ANTIBIOTIC RESISTANCE

Mr. Walter Jakubowski

WaltJay Consulting

2850 E. Rockhurst Lane

Spokane, WA 99223

Phone: 509-448-3535

Email: [waterbug@att.net](mailto:waterbug@att.net)

Mr. Jakubowski is a private consultant with more than 50 years of experience working with waterborne pathogens, especially enteric viruses and protozoa such as *Giardia* and *Cryptosporidium*, and whose current interests involve microbiological issues related to indirect and direct potable reuse of wastewater. Recent projects include being a co-editor of the protist section for the UNESCO Global Water Pathogen Project and serving on California's direct potable reuse (DPR) panel. In this latter activity, he was the lead in preparing the DPR panel's antibiotic resistance (ABR) issue paper. Mr. Jakubowski also presented an invited paper on ABR at the 2016 Clarke Prize Conference and has been invited to be a member of the ABR panel at the 2017 IWA Water Reuse Conference. He has served as a consultant to the World Health Organization on pathogenic intestinal protozoa (for development of the International Drinking Water Guidelines), and to the Pan-American Health Organization on environmental virus methods. He was instrumental in conducting the first international symposium on *Legionella* and Legionnaire's Disease at the Centers for Disease Control. He initiated landmark studies on the human infectious dose of *Cryptosporidium* and chaired the Joint Task Group on Pathogenic Intestinal Protozoa for *Standard Methods for the Examination of Water and Waste Water* from 1978 to 2005. He was a charter member of USEPA's Pathogen Equivalency Committee and served on that committee until his retirement from the U.S. Public Health Service/Environmental Protection Agency in 1997. He has research publications on hospital pharmacy; on microorganisms in oysters and clams under the federal Shellfish Sanitation Program, and numerous peer-reviewed publications on determining the health effects and public health significance of pathogens, especially intestinal protozoa and viruses, in drinking water, wastewater and municipal sewage sludge. Mr. Jakubowski has degrees in

Pharmacy from Brooklyn College of Pharmacy, Long Island University; in Microbiology from Oregon State University, and graduate training in Epidemiology from the University of Minnesota.