

**COMMUNITY ENVIRONMENTAL  
MONITORING PROGRAM (CEMP)  
ANNUAL WORKSHOP  
July 27-30, 2009  
BRISTLECONE CONVENTION CENTER  
Ely, Nevada**



**SPEAKER BIOS AND PRESENTATION ABSTRACTS**

## **Richard Blankenbecler, Emeritus, Stanford University**

Richard Blankenbecler is Professor Emeritus at Stanford University, Adjunct Professor at the Nevada Cancer Institute, and Adjunct Professor of Physics at Virginia Tech University.

After receiving my Physics PhD from Stanford in 1958, I became a tenured professor at Princeton University and then returned to the Stanford Linear Accelerator Center (SLAC) in 1969. I became head of the theory group and retired in 2003. I had switched from theoretical particle physics in the 1990's to biophysics and have worked on x-ray protein structure measurements, gene modulation, and the effects of low dose radiation on cell function. I am presently developing an improved cancer radiation therapy with colleagues at Virginia Tech and Wake Forest Universities.

### **CARE Radiation Therapy: Increasing Effectiveness and Reducing Side-Effects**

#### **Abstract:**

This talk describes the use of a modified treatment protocol, i.e., radiation dose, geometry, dwell time, etc., to mitigate some of the deleterious effects of cancer radiotherapy by utilizing a natural cell repair processes, i.e., adaptive response. If bad side effects can be reduced, a more aggressive and effective therapy can be utilized. This is called CARE (Cell Adaptive Response Effect) Therapy. Data will be reviewed that support the fact that a small dose of radiation will activate damage repair genes within a cell - among these are DNA, RNA, heat, and oxidative stress repair. Once the mechanisms are fully active, they will efficiently repair the severe damage from a much larger (~ 100x) radiation dose. The data ranges from experiments on specific cell types - mice, canine and human -using microarray (gene chip) techniques up to experiments on complete organisms. The damage from a large radiation exposure to healthy tissue can be reduced by a low level pre-dose given several hours before the large dose. We have carried out radiation experiments on canine cell cultures and on canine cancer patients (not test animals) at the VaTech Veterinary Hospital. Five dogs have been treated quite successfully (with 5 control subjects). The adaptive response reduces the damage to the healthy cells surrounding the cancer. It is probable that low dose adaptive response can mitigate both the deleterious effects of chemotherapy and damage to radiation workers.

## **Rob Boehlecke, National Nuclear Security Administration, Nevada Site Office**

Robert Boehlecke is the Federal Project Director for the Environmental Restoration Project. He has worked for DOE since 2008 and has 16 years of environmental, safety, and health experience at the Nevada Test Site. Prior to coming to DOE, Mr. Boehlecke was the Industrial Sites Project Manager for the Stoller-Navaro Joint Venture.

Mr. Boehlecke has a Bachelor of Science degree in Environmental Studies from the State University of New York, College of Environmental Science and Forestry. Mr. Boehlecke also earned a Master of Science degree in Environmental Science from the University of Nevada, Las Vegas. Mr. Boehlecke is a certified Project Management Professional. He also holds the Registered Environmental Manager certification from the National Registry of Environmental Professionals and is a Certified Environmental Manager in the State of Nevada.

## **Environmental Restoration at the Nevada Test Site**

### **Abstract:**

The U.S. Department of Energy National Nuclear Security Administration (NNSA), Nevada Site Office Environmental Management (EM) Program addresses the legacy of contamination resulting from the effects of various historic nuclear activities conducted at the Nevada Test Site and the Nevada Test and Training Range. Within EM, the Environmental Restoration Project is responsible for characterizing and remediating infrastructure, soil, and groundwater sites where radioactive and non-radioactive contamination occurred.

Recently, the Nevada Site Office received American Recovery and Reinvestment Act of 2009 funding to accelerate and accomplish Environmental Restoration activities, some which are driven by regulatory commitments. Regulatory oversight of Environmental Restoration activities is provided by the State of Nevada Division of Environmental Protection under the authority of the Federal Facility Agreement and Consent Order.

Another Nevada stakeholder group that works with EM is the Community Advisory Board (CAB) for Nevada Test Site Programs. Many CAB recommendations have been implemented by Nevada Site Office EM in pursuit of the overarching mission to reduce risk to workers, the public, and the environment.

## **Bruce Church, BWC Enterprises, Inc.**

Bruce W. Church currently is President of BWC Enterprises, Inc., a safety and health consulting and agricultural company; a Senior Research Physicist for the Desert Research Institute and Past President of the Nevada Test Site (NTS) Historical Foundation. Mr. Church received an MS degree in Radiological Health in 1966 from Colorado State University. Mr. Church is the former Assistant Manager for Environment, Safety, Security and Health of the Nevada Operations Office, U. S. Department of Energy. He has been a long time consultant to the Government of Australia for the rehabilitation of the Former British Nuclear Weapons test site at Maralinga, Australia and to the Center of Risk Excellence, Chicago Operations Office, U. S. Department of Energy. Mr. Church has 45 years experience as a Health Physicist. During this time he has specialized in radiation dose assessment, risk assessment, remedial action criteria establishment and in low level waste management, starting the structured program at the NTS in 1974. He initiated the project for fallout dose reassessment of the public downwind from the NTS in 1979 and served as the project manager during the 1980s. He has been involved with environmental remedial action of nuclear weapon test sites throughout the United States, and the Pacific. Mr. Church has served as a consultant to the IAEA on remedial action. His most recent publications discuss the unacknowledged transfer of risk to the remedial worker and the dose received to members of the public from the transportation of Low Level Waste.

**Susan Dawson, Utah State University**  
**Gary Madsen, Utah State University**

Susan E. Dawson, Ph.D., is professor of social work in the Department of Sociology, Social Work and Anthropology at Utah State University in Logan, Utah, since 1988. Her professional training is in the area of social policy and occupational and environmental health.

Gary E. Madsen, Ph.D., is professor emeritus of sociology in the Department of Sociology, Social Work and Anthropology at Utah State University in Logan, Utah, since 1971. His professional training is in the area of health and environmental sociology.

Both Susan and Gary have collaborated on uranium mining and milling issues since 1989. Their work has been largely in the American Southwest working with the Navajo and other First Nation's peoples on the psychosocial and health aspects of radiation exposures. They have also been involved with RECA (Radiation Exposure Compensation Act) legislation of 1990 and 2000.

**Psychosocial and Health Impacts of Uranium Mining and Milling on Navajo and other Tribal Peoples in the American Southwest**

**Abstract:**

Extensive uranium mining and milling in the United States began in the 1940s and continued through the 1980s. During that time thousands of Navajo and other tribal peoples in the Southwest were employed in the industry both on and off tribal lands. In this presentation we will examine both the psychosocial and health impacts of having worked in these occupations. We will also discuss current issues involving a resurgence of uranium mining and milling particularly regarding the Navajo Nation.

## **Bruce Hurley, National Nuclear Security Administration, Nevada Site Office**

Bruce Hurley is a physical scientist at the National Nuclear Security Administration, Nevada Site Office (NSO). Dr. Hurley holds degrees in geology from North Carolina State (B.S.), North Carolina (M.S.), and Washington State (Ph.D.), and has worked in technical projects for more than forty years. At NSO, his duties include support of environmental monitoring and regulatory compliance activities and assessment of field and program reporting activities. During his career, he has worked in geologic mapping, mineral exploration, university teaching, geologic/hydrologic site characterization, radiological emergency response training and deployment, environmental monitoring, and regulatory compliance. A Nevada resident for twenty-eight years, his background includes twenty-two years with the federal government and nine years with government contractors. His wife, Janice, has been a nursing educator at Sunrise Hospital in Las Vegas, for the past twenty-three years. His elder daughter, Erin, is a 2004 graduate of UNR and works for the Area Health Education Center in Miami, Florida. His younger daughter, Kyle, recently received her MBA from Gonzaga University and is employed by the National Credit Union Administration in Oakland, California.

### **Radioactivity in the Geologic Environment**

**Abstract:**

This presentation will discuss the occurrence of ionizing radioactivity in natural geologic contexts.

## **Jerry Martin, U.S. Public Health Service Commissioned Corps (ret)**

B.S. in Industrial Engineering, Tennessee Tech University, 1965.  
M.S. in Health Physics, Texas A&M University, 1970

U.S. Army Chemical Corps, 1965-1967

Primary area of work was with the Nuclear Weapons Surety Program and nuclear weapons accidents and recovery.

Adjunct professor in radiological health, Texas A&M University, 1968-1969.

U.S. Army Medical Service Corps, 1971-1977

Primary area of work was as radiological physicist for Wm. Beaumont Army Medical Center, El Paso, Texas (1971-1973).

Primary area of work was as instructor in the Nuclear, Biological, and Chemical Division, U.S. Army Academy of Health Sciences, Fort Sam Houston, Texas (1973-1977).

U.S. Bureau of Radiological Health 1977-1991

Chief, Training and Inspections Branch.

Primary area of work was in the electronic produced ionizing radiation regulatory program.

U.S. Environmental Protection Agency 1991-1999

Deputy Director, Nuclear Radiation and Assessment Division.

Primary area of work was offsite radiological monitoring support of the nuclear weapons testing program (1991-1994).

Primary area of work was senior science advisor for the Cassini unmanned space mission to Saturn (1994-1999).

## **Atomic Structure and History**

A discussion of the atomic structure of the atom to include subatomic particles of the nucleus, isotopes, neutron/proton ratio, discovery of radioactivity, splitting the atom, chain reactions, critical mass, the first atomic “pile”, the Manhattan Project, and the historical significance of these discoveries and developments.

## **Nuclear Weapons Characteristics**

Unclassified discussion of the design and development of nuclear weapons including supercritical mass, multiplying chain reaction, neutron cross-section capture, fission generation time, implosion and gun-type weapons, thermonuclear weapons, and fission fragment distribution.

# **Joseph R. McConnell, Desert Research Institute**

## **Research Professor, Director of DRI's Ultra-Trace Chemistry Laboratory**

Ph.D., Hydrogeology and Water Resources, University of Arizona

M.S., Exploration Geophysics, Stanford University

B.S., Geology and Geophysics, Yale University

Dr. Joe McConnell's research interests include snow and global-scale hydrology, ice core and atmospheric chemistry, glaciology, and ice sheet mass balance — with particular emphasis on understanding industrial pollution in polar regions and the role of human activities in global climate and sea level change. Current NSF and Foundation-funded research projects include ice core chemistry-based studies in Greenland, Antarctica, and the Americas. Central to this research are national and international collaborations and DRI's unique ultra-trace ice core analytical laboratory. McConnell's group also conducts collaborative research in hydrology and water balance in snow-dominated, semiarid regions such as the American West with funding from USGS and NSF.

## **Effects of Human Activities on the Arctic Climate**

### **Abstract:**

Climate is changing at an alarming rate in the Arctic. Sea ice is disappearing and glaciers, ice sheets, and permafrost melting almost before our eyes. We review recent changes in the Arctic and, using the environmental history archived in glaciers and ice sheets and revealed through ice core records developed at DRI, explore the impacts of human activities on this remote region of the earth.

## **Daniel W. Miles, Emeritus, Dixie State College**

Daniel W. Miles received his Ph.D. from the University of Utah in 1967. From 1968 to 1985 he taught physics at Westminster College in Salt Lake City. From 1985 to 2001 he taught physics at Dixie State College in St. George, Utah. He was Adjunct Research Specialist in the Chemistry Department of the University of Utah from 1968 to 1983 as part of Professor Henry Eyring's large research group. He is the author or co-author of forty two scientific publications in peer reviewed scientific journals and three other scientific articles. Presently, he is Professor Emeritus, Dixie State College.

## **The Phantom Fallout-Induced Cancer Epidemic in Southwestern Utah**

### **Abstract:**

The Phantom Fallout-Induced Cancer Epidemic in Southwestern Utah is about a fear campaign beginning in the fall of 1978 creating an atmosphere of bitterness, anger, and emotional hysteria in southwestern Utah over the latent effects of exposure to fallout from above-ground tests of nuclear weapons in Nevada during the 1950s. Downwinders were told that their cancer rates were already more than double nationwide rates; that many more would soon be falling victims to cancer and other radiation-induced adverse health consequences; and that their descendants would suffer from adverse genetic effects for generations.

Downwinders were soon recalling a neighbor or relative that died of cancer or had diabetes, or had a miscarriage, or had a baby born with a birth defect since the fallout era. Some recalled being afflicted during the fallout episodes with badly burned skins, hair losses, and other symptoms of radiation sickness. Their stories would eventually be published in the transcripts of a trial and a town meeting, in newspapers and magazines, in books and told to nationwide TV audiences. The Utah and national media have periodically continued to publish downwinders' stories of fallout-induced cancers.

The author challenges the widespread belief, based mostly on anecdotal 'evidence' and not on science, that fallout caused a cancer epidemic in southwestern Utah. Much of this 'evidence' was found to be not persuasive in relation to base line cancer rates or exaggerated.

## **Duane Moser, Desert Research Institute**

Duane Moser is a microbial ecologist who has straddled the line between Life and Earth Sciences for over 15 years. Moser's examinations of the natural world began during his pre-teens in rural Wisconsin, where he discovered that monitoring of environmental parameters improved fishing success. Initially a Geology major, Moser received B.S., M.S., and Ph.D.s degrees in Microbiology from the University of Wisconsin. His doctoral research involved the diversity and biogeochemical impacts of microorganisms from freshwater sediments, particularly on the Great Lakes. He also studied sea ice microbial communities in Antarctica and marine sediments at the Woods Hole Oceanographic Institute in Massachusetts. Prior to joining DRI in 2004, Moser performed two post-docs: first at Princeton University in Geosciences and then at the Pacific Northwest National Laboratory in Washington State, where he managed the Witwatersrand Deep Microbiology project in South Africa. To date, Moser has authored 43 peer-reviewed publications, including two in *Science*. His lab at DRI has supported three post-doctoral associates, two graduate students, and nineteen undergraduate researchers. He currently works on a variety of applied and fundamental science projects focused on life in extreme environments, lower foodweb concerns, and utilizing microorganisms for environmental clean-up.

### **Deep Earth Life and the Nevada Test Site Connection**

#### **Abstract:**

Over the past decade, powerful new molecular techniques have been used to detect and explore the diversity of microbial Earth's most extreme habitats. Thus, it might be surprising to learn that the ultimate depth to which life extends into the terrestrial subsurface remains a nearly complete unknown. Starting in 1997, our group utilized the ultradeep gold mines of South Africa to begin to explore the Earth's deep hot biosphere. There, literally miles deep within ancient crustal rocks, we discovered isolated microbial communities which operate in the complete absence of solar inputs. In every mine we sampled, at depths of great than 2.5 km, a single species of bacteria dominated. *Desulforudis audaxviator* spp. nov. or the "bold traveler" represents a new genus and is currently accepted as the first lifeform known to exist as a single species ecosystem and to utilize energy from radioactive decay for growth. It was thus a great surprise when, in the summer of 2008, our team discovered the same species in radioactive subsurface atomic bomb detonation cavities at the Nevada Test Site (NTS). We are currently exploring the possibility that these unique organisms have not only found a way to capitalize on the energetic legacy of nuclear weapons testing and manufacture, but that this unusual mode of life may represent the last best hope for life on (or in) Mars.

## **Joyce E. Penner, University of Michigan**

Joyce E. Penner is the Ralph J. Cicerone Distinguished University Professor of Atmospheric Science. She is a leading expert on the interactions of chemistry, aerosols, and their effects on the climate system. She initiated the studies of climate forcing from aerosols produced in biomass burning as well as absorbing black carbon aerosols from fossil fuel burning. These effects are now recognized as important to include in estimates of the total forcing over the last 100 years. She was the coordinating lead author for Chapter 5: Aerosols, their direct and indirect effects, which was part of the report from the Intergovernmental Panel on Climate Change (IPCC) to the United Nations in 2001. She also acted as a report coordinator for the IPCC report on Aviation and the Global Atmosphere (1999). She joined the Department of Atmospheric, Oceanic, and Space Sciences at Michigan in 1996. Previously she worked at the Lawrence Livermore National Laboratory where she was Division Leader of the Climate Research Division. She was educated at the University of California, Santa Barbara, and at Harvard University.

### **Climate Change Science: Can the Skeptics Ever be Convinced?**

#### **Abstract:**

Climate models are the primary means by which the theory of climate change has been tested. However, despite periodic assessments by the Intergovernmental Panel on Climate Change (IPCC) that claim an increasing ability to measure and understand past changes as well as to project the effects of future increases in greenhouse gases, a small number of scientists as well as some of the general public remain skeptical about some aspects of the science or that human-induced climate change is something that requires aggressive action to slow the growth of greenhouse gases. IPCC assessments have promoted the concept of a "scientific consensus" in order to organize information for the purpose of improving the effectiveness of policy making. Yet a healthy skepticism remains important in order to advance our understanding and the science of climate change. This lecture will explore a number of the arguments proposed by the "climate skeptics" and offer evidence that both supports and refutes these arguments. Some of these arguments are based in reality and provide future avenues for research that will eventually enable climate change science to rest on a firmer foundation.

## **Kelly Redmond, Desert Research Institute**

Kelly T. Redmond was born in Wausau Wisconsin, raised in southwest Montana, received a B.S. degree in Physics from the Massachusetts Institute of Technology (1974), and M.S. (1977) and Ph.D. (1982) degrees in Meteorology from the University of Wisconsin in Madison. He worked in the Atmospheric Sciences Department at Oregon State University from 1982-1989, the last 6 years as State Climatologist for Oregon, and served as President of the American Association of State Climatologists in 1989-90. Since 1989 he has been the Regional Climatologist at the Western Regional Climate Center located at the Desert Research Institute in Reno, as well as Deputy Director of WRCC since 1992. His research and professional interests span every facet of climate and climate behavior, its physical causes and variability, how climate interacts with other human and natural processes, and how such information is acquired, used, communicated, and perceived.

### **Climate Change and the Great Basin**

#### **Abstract:**

The Great Basin is a region of considerable contrast, and this is reflected in its underlying climate. Arid valleys are found next to mountain ranges that seemingly pull water from the sky. The high altitude and low humidity combine to cause large differences between daytime and nighttime temperatures. Elevation acts as a strong control on climate; many of its effects are readily visible throughout the region, and other effects are more subtle. Climate conditions can vary substantially from year to year, and can differ in space during a given set of years, between the eastern boundary, the center, and the western margins near the Sierra Nevada. In recent years, a new source of variability has begun to express itself. Although climate will continue to show many of the same behaviors that it always has, a slow but steady warming is expected to become ever more apparent as time passes. Climate projections from many types of models show near unanimity on this point. There is less agreement on projected changes in precipitation, but a general consensus seems to be that annual precipitation will not greatly change, but precipitation may be distributed somewhat differently through the year, with more in winter, and less in spring, summer, and autumn. Temperatures rises would lead to more rain and less snow. This alone would have impacts on water supplies and hydrologic processes. Other effects would be expected on plants and animals, invasive species, and fire characteristics, many of these interlinked. Until very recently, the topic of climate change has not received much attention in this region, but that is no longer the case. This presentation will cover the historical and present-day background climate, expected changes over the next several decades, and tools and observations accessible to the public to help track whether, and how, climate has been varying in the Great Basin.

## **David E. Rhode, Desert Research Institute**

Dr. Rhode is a prehistorian, archaeobotanist, and paleoecologist with 25 years experience throughout western North America. His main focus of research concerns prehistoric human adaptations and paleoenvironmental change in arid environments. Towards this end, he has analyzed packrat middens in the eastern Great Basin and western Mojave Desert, examined plant remains from various archaeological sites throughout the Great Basin and American Southwest, and studied phytoliths (mineral bodies from plant cells) extracted from archaeological sites. In addition to his paleoenvironmental research, he has directed and managed several archaeological projects, including a large cultural resources protection program at Yucca Mountain, Nevada, as well as in California, Oregon, New Mexico, Washington, and Alaska. Recently, he has also explored early human occupation in China and Jordan.

During his studies of regional land use patterns of prehistoric people in the Great Basin, Dr. Rhode expanded the use of dating techniques such as thermoluminescence and obsidian hydration for developing chronologies of regional land use patterns as reflected in the surface archaeology of the Great Basin. Southwestern experience includes a detailed study of prehistoric and historic study of Zuni agricultural land use and water control in west-central New Mexico. His interest in the history of Native American groups in western North America led to his co-editing a recent volume on the Paiute, Shoshonean, and Ute ("Numic") peoples who inhabited the intermountain west in late prehistoric and historic times and to the publication of an illustrated ethnobotany of southern Nevada.

## **Prehistoric Environments and People in the Bonneville Basin**

### **Abstract:**

The Bonneville Basin of western Utah has undergone dramatic environmental changes since the final drying of Pleistocene Lake Bonneville. These environmental fluctuations, ultimately driven by climate, have in turn affected how native peoples made a living in the region. In this paper I look at the record of Holocene environmental change in the Bonneville Basin, and the nature of human adaptations in response to those changes.

## **Pete Sanders, National Nuclear Security Administration, Nevada Site Office**

Peter Sanders has worked as a physical scientist with the National Nuclear Security Administration, Nevada Site Office (NSO) since 1991. While with NSO he has held various positions involved with environmental remediation and environmental compliance. From 1987 to 1991 he worked for the U. S. Environmental Protection Agency. Prior to his work with the federal government he was employed in the mining industry. Mr. Sanders holds degrees in geology from Southern Illinois University (B.S.) and New Mexico State University (M.S.).

# Gary Sandquist, Emeritus, University of Utah

## TITLES/POSITIONS

Professor Emeritus of Mechanical Engineering, University of Utah  
Distinguished Visiting Professor Dept. of Civil & Mechanical Engineering, US Military Academy, West Point, NY  
Distinguished Visiting Professor, Nuclear Engineering, Department of Physics, US Military Academy, West Point, NY  
Former Director of Nuclear Engineering Program, University of Utah  
Adjunct Professor of Civil Engineering, University of Utah  
Professor, Affiliate Faculty, Idaho State University, Pocatello, Idaho  
Registered Professional Engineer (Mechanical & Structural: UT, Mechanical: MN, NY, Nuclear: CA)  
Former NRC Licensed Senior Reactor Operator (U.S. NRC)  
American Board Certified Health Physicist (AB-CHP)  
Diplomate: Environmental Engineer (DEE), American Academy of Environmental Engineers (ACEE)  
Nuclear Science Expert for United Nations, International Atomic Energy Agency (UN-IAEA)  
Chief Scientist & Quality Assurance Officer – URS Washington Systems Management Solutions (URS/WSMS)  
Manager and Owner, Applied Science Professionals, LLC (ASP/LLC)  
Observer, Accreditation Board for Engineering and Technology (ABET)  
Member, ANS, ASME, HPS, ASQ, ASEE, Pi Tau Sigma, Tau Beta Pi, Sigma Xi, Alpha Nu Sigma  
Technical Speaker, Nuclear Energy Institute (NEI), Senior Member, American Society for Quality (ASQ)  
Commander, U.S. Naval Reserve - Retired (O-5, USNR)  
Fellow of the American Nuclear Society (ANS) and American Society of Mechanical Engineering (ASME)  
Certified Quality Auditor (ASQ), Registrar Accreditation Board Certified Provisional Auditor (RAB)

## EDUCATION

B.Sc. Mechanical Engineering, University of Utah, 1960  
M.S. Engineering Science, University of California Berkeley, 1961.  
Ph.D. Mechanical and Nuclear Engineering, Minor - Mathematics, University of Utah, 1964  
MBA Executive-Masters Degree in Business Administration, University of Utah, 1995  
Postdoctoral Fellow, Nuclear Engineering, Massachusetts Institute of Technology, 1969 - 1970  
Sabbaticals: Ben Gurion University-Negev, Nuclear Engineering Department, Beer Sheva, Israel, Jan-May 1986

## ACADEMIC EXPERIENCE

Professor, Mechanical Engineering, University of Utah, Jul 1975 - present  
Visiting Scientist, Nuclear Engineering, Massachusetts Institute of Technology, Sep 1969-Aug 1970  
Associate Research Professor of Surgery, University of Utah, Jul 1974 - Jun 1986  
Visiting Professor, Nuclear Engineering Department, Ben Gurion University-Beer Shiva, Israel, Jan-Jun 1986  
Visiting Professor, Physics & Civil & Mechanical Departments, US Military Academy, West Point, NY, 2003-2005

## RESEARCH

Nuclear science & engineering, Safeguards and nonproliferation issues (IAEA), Risk assessment, Reactor physics, Health physics, Nuclear research reactors, Criticality evaluations, Applied math / physics, Environmental radiation monitoring  
Supervised 21 PhD students and 65 MS students

**PUBLICATIONS** Over 700 publication/presentations in nuclear science, engineering, energy, health physics, environmental sciences including

6 Books and Book chapters

195 refereed Journal, Proceedings, Conference & Transactions Articles.

151 Technical Papers orally presented at Technical, Scientific, and Government Meetings.

352 Technical Reports for Academic, Industrial and Government Agencies

Developed 17 major Technical Computer Codes used in industry and by government agencies

Participated in 197 Technical Meetings, Conferences, Workshops, Seminars, Government Hearings

## Nuclear Power: An Environmental Solution

This presentation discusses nuclear power in the context of other strategies for addressing global energy demands, and how nuclear power can help address global climate change concerns.

## **Richard Toohey, Oak Ridge Associated Universities**

Dick Toohey received his Ph.D. in physics from the University of Cincinnati in 1973. He spent the first part of his career at Argonne National Laboratory in both research and operational health physics. He has been at ORAU since 1994, where he has served as director of the Radiation Internal Dose Information Center, as Sr. Health Physicist for REAC/TS, and is currently the Director of dose reconstruction programs. He is certified in comprehensive practice by the ABHP, is a member of the National Council for Radiation Protection and Measurements, and has served as a Director, Secretary, Treasurer and now President of the Health Physics Society. Dick has 125 publications in the open literature, and is a retired Lt. Col., US Army Reserve. He and his wife Beverly live in Oak Ridge, where they provide staff services to the resident cat.

## **Why No One Believes Us: Cognitive Neuroscience and Radiation Risk**

### **Abstract:**

Public perception of radiation risks and their acceptability remains far from the consensus of radiation protection specialists, despite decades of individual and organizational efforts at risk communication. We have eagerly adopted the guidance of risk communication specialists, and presented the facts in a non-threatening and understandable fashion. Nevertheless we continue to encounter intense opposition to the development of nuclear power plants, waste storage sites, food irradiation facilities, and other applications of radiation and radioactive materials. We have been told such opposition is an emotional reaction that we must allow to be expressed, and then calmly and coolly respond with our understandable facts. One understandable fact is that what we have been doing simply doesn't work. The rapid development of the cognitive neurosciences, particularly evolutionary psychology, over the past twenty years or so has provided remarkable insights into this situation. Human brains come into the world with certain genetically determined methods of classifying sensory inputs called "memes," a term adopted from cultural anthropology. The "contagion" meme is a key player in response to radiological issues, as are the "justice" and "pattern-seeking" memes. Furthermore, the human decision-making faculty does not exist in Descartes' *res cogitans*, but in a hard-wired network of literal gut feelings and other body states we call emotions. Understanding and implementing these findings may lead us to more effective communication efforts, but also warn us that effecting significant behavioural changes will be a Sisyphean task.

## **Stephen G. Wells, Desert Research Institute**

Dr. Stephen G. Wells, President of the Desert Research Institute (DRI) of the Nevada System of Higher Education, oversees one of the world's largest multidisciplinary environmental research organizations with approximately 500 scientists, technologists, students, and other support staff. Wells has served as the chief executive officer of DRI since 1999, overseeing the growth of institutional revenues from \$23.8 million per year to greater than \$60 million currently as well as state-of-the-art research campuses in both Las Vegas and Reno, as well as satellite research stations in Boulder City, Nevada; at the Sierra Nevada College near Lake Tahoe; and at 10,500 ft elevation near Steamboat Springs, Colorado. Dr. Wells leads three core divisions and four interdisciplinary science centers that serve the State of Nevada and every continent in the world, focusing on air, land, life, and water. He is a graduate faculty member in the Hydrologic Sciences Program and Department of Geological Sciences at the University of Nevada, Reno and is an adjunct research professor at the Institute of Earth Environment, Chinese Academy of Sciences in Xi'an, China. He serves on the boards of Research Parks Ltd., Economic Development Authority of Western Nevada, Nevada Development Authority, Nevada Institute of Renewable Energy Commercialization, Gathering Genius Inc. as well as on advisory boards of the University of Arizona's Biosphere 2, the Nevada Museum of Art, Indiana University, and the University of Cincinnati. Dr. Wells has published over 70 peer-reviewed papers and book chapters and edited six volumes in the earth sciences, and he has received three national awards from the Geological Society of America. Dr. Wells has held faculty positions at the University of New Mexico, University of California-Riverside, Los Alamos National Laboratory, and the U.S. Geological Survey.

## **Bill Wilborn, National Nuclear Security Administration, Nevada Site Office**

**Title:** Federal Sub-Project Director for the Underground Test Areas (UGTA)

**Education:** Bachelor of Science in Geology, University of Nevada Las Vegas, May 1996

**Certifications:** Project Management Professional  
Federal Project Director

**Background:** I have worked in DOE's Environmental Management Program since 1991, both in Technology Development and Environmental Restoration Projects. I have been working with UGTA for the past 6 years, and as the Sub-Project Director for the past 5 years.

### **Update on Underground Test Area (UGTA) Groundwater Studies at the NTS**

**Abstract:**

This presentation will discuss project objectives, regulatory requirements, the current status of five corrective action units (CAUs), risk perspectives and public protection.

# **CEMP Staff, Desert Research Institute**

## **Scott Campbell, Division of Hydrologic Sciences**

Hydrogeologist, Desert Research Institute (DRI), Division of Hydrologic Sciences (DHS), Nevada System of Higher Education. My primary task has been to measure and record parameters used to analyze the status of the environment and environmental systems. I am involved in the Under Ground Test Area (UGTA) program to characterize the deep exploratory wells for construction, development, and aquifer testing, and the Community Environmental Monitoring Program (CEMP) for monitoring the ambient environment for radiological contaminants. I have participated in surface water rainfall simulation studies testing different aged soil for their runoff properties at multiple locations around the west. I am involved in the Yucca Mountain Federal Initiative studying air particulate and sediment contaminant transport. I have been involved in the proposal process from conception to execution and acceptance.

I have been with DRI for ten years and my primary interest are in alternative energy and the weather.

## **Steve Curtis, Division of Earth and Ecosystem Sciences**

Mr. Curtis has been a national response radiological counterterrorism field deployment team leader on the Nuclear Emergency Search Team (NEST) and the radiological Consequence Management teams for 15 years. He was instrumental in program management for the DOE radiological response deployment modernization effort post 9/11. He holds a Bachelors degree in Electronic Engineering and a Masters degree in Health Physics, both from the University of Nevada, Las Vegas. As an officer in both the active duty Army and the Nevada National Guard, Steve served in leadership positions as an Armor officer and as a strategic communications design and installation engineer. As a radiological expert, Steve has deployed to field missions all around the world in support of DOE and DoD in response to counterterrorism incidents and scientific experiments.

Currently, Steve is president of Alphatech, Inc. which is a company formed to enhance the application of radiation science to real-world problems, especially in counterterrorism and national security. His clients include a number of DoD and DOE subcontractors. He is also working closely with the Nevada System of Higher Education to develop outreach opportunities and industry collaborations that will enhance the research and academic opportunities for both UNLV and DRI. Steve has been a part-time member of the CEMP team since 2005, mostly in the area of public outreach.

## **Radiobiology**

### **Abstract:**

The human body can be harmed by radiation. There are many aspects of radiobiology and how radiation can harm human tissue. The general public tends to either not understand or misunderstand the mechanisms of radiation exposure as it relates to public health. This talk explores the basics of radiobiology by discussing the types and vectors for radiobiological harm. Internal and external dose are discussed as are the differences between exposure and dose. Long-term (stochastic) and short-term (deterministic) effects are shown and basic chemistry interactions are explained. The discussion is aimed at a novice audience composed of people not acquainted with Health Physics. It is intended to orient the public on the effects of radiation and generate questions regarding the inherent fear usually accompanying the topic of radiation and radiation effects.

## **Dee Donithan, Division of Hydrologic Sciences**

Mr. Donithan graduated from the University of Illinois with a B.S. in Geology. His first employment was in the oil and gas industry located in the Appalachian Basin as a geophysical engineer and analyst, followed by a consulting role in the Appalachian, Michigan and Illinois Basins. Afterward, due to a periodic slowdown in the industry, he accepted a position with the Lawrence Livermore National Laboratory at the Nevada Test Site. The position encompassed both geological and drilling responsibilities. When nuclear testing subsided, he accepted a position with the Desert Research Institute which is actively involved in the Hydrological Nuclear Environmental Studies at the NTS. He has been responsible for collecting annual CEMP water samples from community drinking water sources.

## **Ken Giles, Division of Hydrologic Sciences**

While I was in the US Navy, I was assigned to the US Navel Radiological Defense Lab in San Francisco, CA. After the completion of my Navy enlistment, I was employed by Lovelace Foundation for Medical Education and Research in Albuquerque, New Mexico. There I trained to be a veterinary x-ray technician where I worked in this capacity for approximately 2 years.

While at Lovelace Foundation, I met Dr. Ronald Engel, a DVM with a PhD in Radiology working for U. S. Public Health as a Public Health Officer, stationed in Las Vegas, Nevada. The U.S. Public Health was in need of technicians for an experimental dairy and beef herd that was being formed at the Nevada Test Site, also with agriculture background. I worked for U.S. Public Health Service in the Environmental Research Division, until the U.S. Environmental Protection Agency was created. I continued working for US EPA for another 40 years. During my employment with US EPA, I worked on the Nevada Test Site, with the dairy and beef herds, conducting milk

sampling, as well as working with “Big Sam”, a fistulated steer whereby rumen samples were taken periodically and analyzed. I also conducted a mule deer migration study at the Nevada Test Site for approximately 10 years. I was able to capture 160 deer alive and put radio transmitters and ear tags on all of the animals with most of the work being done solo and at night. I have also been involved in a variety of radiation experiments involving both dairy and beef cattle.

After the Nevada Test Site Farm was closed and all biological studies terminated, I was transferred to the off-site program that was responsible for all off-site radiation monitoring around the Nevada Test Site. There I became field supervisor, responsible for all equipment and all the sampling done in the Eastern zone which encompassed Rachel, Nevada to the Colorado boarder and North to Idaho.

After testing stopped, I retired from the U.S. Environmental Protection Agency and came to work for Desert Research Institute, where I continue to work at the present. My responsibilities include running the ranch routes from Tonopah and Ely areas.

## **William “Ted” Hartwell, Division of Earth and Ecosystem Sciences**

Ted has served as the Program Manager for the [Community Environmental Monitoring Program](#) (CEMP) for nearly 10 years. He is also an Associate Research Archaeologist at DRI and presently serves as the Deputy Director of the Division of Earth and Ecosystem Sciences.

Ted's archaeological research has focused on three geographic regions: the southern Great Basin and southern Great Plains of the United States, and the pampas of Argentina. Specific interests include hunter-gatherer lithic technology, caching behavior, quarrying behavior, and soil formation processes.

His research activities have included investigations of a historic toll road in north-central Nevada, an examination of prehistoric quarrying behavior in the southern Great Basin, late Paleoindian stone tool technology on the Plains, and participation in a study comparing and contrasting human adaptation on the U.S. southern Great Plains and Argentinean pampas. In addition, Ted has studied how popular culture can affect the public perception of science, most recently speaking as an invited participant at a workshop on "Comet and Asteroid Impacts and Human Society." He also has produced a publication for the general public that discusses archaeological research at Yucca Mountain on the Nevada Test Site.

Ted is also a professional cellist with the Las Vegas Philharmonic. He lives in Las Vegas with his wife Doreen, 3-year old daughter Chloe, and Ash the cat.

## **Lynn Karr, Division of Hydrologic Sciences**

Lynn is the Field Supervisor for the Community Environmental Monitoring Program with the Desert Research Institute. Lynn has 18 years experience in environmental radiation monitoring including 8 years in radiation emergency response with the Environmental Protection Agency, the Department of Energy's Radiation Assessment Program (RAP), Federal Radiation Monitoring and Assessment Center (FRMAC) as the Calibration Officer and a Responder, and was an instructor with Radiological Emergency Operations (REO) and Radiological Emergency Training for Local Emergency Responders (RETLER) taught at the Nevada Test Site and abroad. Lynn was the Calibration Officer for HI-Q Environmental Products and for 7 years with the EPA where he also served as the Assistant Radiation Safety Officer. Lynn received his Bachelors degree from Southern Utah State College with a major in Geology and a minor in History.

## **Grant Kelly, Division of Atmospheric Sciences**

Grant Kelly develops internal and external web sites for the CEMP, as well as performs system administration of the web server. He works for the Western Regional Climate Center (WRCC) at DRI in Reno. Grant is involved in many other projects with the WRCC, providing web application programming, system administration, and other computer and internet-related responsibilities. He's a Mac.

Grant earned a Bachelor's degree in Computer Science from the University of Nevada, Reno in 2005 and joined DRI shortly after graduation. In his free time, he enjoys snowboarding, wake boarding, mountain biking, ultimate frisbee, and most recently, disc golf.

## **Barbara Kennedy, Division of Hydrologic Sciences**

I was born in Toronto, Ontario, Canada and moved to Los Angeles, California with my parents and two sisters when I was three years old. I remained in the LA area until 1990 then relocated to Las Vegas, Nevada.

From 1980 – 1990 I worked at Beverly Enterprises, Inc. in Pasadena, CA as the Assistant to the Office Manager and then four years as a Senior Word Processor. From 1989-1990 I worked in Crowd Management in Los Angeles, CA at various events at the Los Angeles Sports Arena and Coliseum as an usher and ticket taker. I have been with DRI in Las Vegas since 1990, starting as a receptionist, then for several years as the DRI Travel Agent in the South. At present, I am the CEMP Coordinator and assistant to the DHS Business Manager.

I have two daughters, April Spease and Kathy Greene. April works for the City of Los Angeles and is an Ambassador for the LA Dodgers. Kathy works for AT&T in Las

Vegas. I have two grandsons, Justin Reagan and Patrick Greene. Justin works as a HVAC technician in Las Vegas, NV. Patrick is a second year student at the University of Utah and is the starting Long Snapper for the Utah Football Team.

I love to travel – upcoming travels are Maui in October 2009 and Israel in May 2010. I hope to retire in December 2010.

## **Cheryl Martin, Division of Earth and Ecosystem Sciences**

Cheryl Martin has been responsible for providing field supplies and tracking equipment for CEMP since 2001 and has lived in the Las Vegas area since 2000. She grew up in Dallas, Texas and spent one year in the San Francisco Bay area prior to coming to Nevada. Her first field of interest is archeology, in which she will be receiving her Master's degree in December 2009. When not working on CEMP, she is in the field conducting cultural resources inventories or creating computer maps for archaeological and other projects. She also has a Master's degree in Library Science and a Bachelor of Science in Education from the University of North Texas. Cheryl has other interests, but until her Master's Thesis is done, she's forgotten what they are.

## **Greg McCurdy, Division of Atmospheric Sciences**

Associate Research Climate Applications Specialist  
Division of Atmospheric Sciences  
Western Regional Climate Center

M.S., Soil Science/Biometeorology, Utah State University  
B.S., Physics, Brigham Young University  
A.D., Arts and Sciences, Ricks College, Idaho

Mr. McCurdy's interest is in the ongoing installation, assembly, programming, operation and maintenance of a variety of data systems, in environments such as UNIX, DOS, WINDOWS, using Basic, Pascal, Fortran, Assembly, C, PERL, C-Shell, and Python. His interests include weather and climate information sources such as RAWS, NWS, SNOTEL, AGRIMET, NVDOE, McIDAS, and ALERT. He is experienced with DROT (DOMSAT Receive Only Terminal), which receives weather platform messages transmitted via GOES satellite and other data telemetry methods. His climate center efforts include converting the distribution of data to internet transmission, including system configuration and installation of LDM-IDD software to receive climate information. He constructed the climate center's WWW home page, and converted the new RAWS data ingestor to the ASCADS data system to provide data transmission error correction and retrieval of all RAWS climate data. Mr. McCurdy is also responsible for the collection and analysis of Sierra Nevada weather station data, the changeover of Difax data from satellite feed to internet feeds, and then establishing processes to print the desired forecast maps and to provide network access to satellite imagery. Mr.

McCurdy is also working on a climate center inventory of data repositories. He assisted in the development of a climate center metadata database and an integrated climate monitoring system.

Mr. McCurdy's background includes deployment and installation of weather observing and research instrumentation. Past projects have included design and development of atmospheric radiation and energy balance monitoring platforms. His expertise includes operation and maintenance of long-term Bowen-ratio ET (evapotranspiration) stations and meteorological/climatological monitoring networks. His experience includes use of Campbell Scientific dataloggers with temperature sensors (thermistor and thermocouple), humidity sensors, wind sensors, pressure sensors (atmospheric and hydrologic), precipitation measuring devices (tipping, weighing and pressure displacement), soil moisture sensors (blocks and TDR), linearity sensors for flow or displacement, O<sub>2</sub> and CO<sub>2</sub> sensors, a variety of atmospheric radiation sensors (longwave and shortwave, silicon or thermopile based), and gamma radiation sensors (pressurized ion chambers). Applications have been primarily agricultural or environmental, but have also included test chambers and space applications.

## **Craig Shadel, Division of Hydrologic Sciences**

Craig is originally from Albuquerque, New Mexico. Except for a couple of years away for graduate school, he has lived in Las Vegas since 1963 (45 years). He received his B.S. in geology from UNLV in 1980 and his M.S. in geology from the New Mexico Institute of Mining and Technology in 1982. He has been with DRI for 25 years. For the first 16 years, Craig was the manager of an Environmental Isotope Laboratory analyzing water, plant and soil samples. The lab handled samples from projects around the world ranging from Test Site well and springs, to atmospheric ice crystals from cloud sampling, to Antarctic lakes and even California vintage wines. The past nine years have been dedicated to the CEMP program as a field monitor and Q.A. Coordinator.

Craig's family has had several connections to nuclear programs. His great uncle was directly involved in selecting the site which became Los Alamos for the Manhattan Project. He had a grandfather who was a machinist in Los Alamos during and after the development of the atomic bomb. His father worked for Sandia Labs at the Nevada Test Site for 35 years where he designed and operated down-hole video cameras systems to survey the boreholes drilled for underground nuclear tests. It is some how fitting that Craig is involved the CEMP program.

Craig has an interesting bit of family history in that he is related to 'Uncle Sam'. His mothers side of his family tree can be traced to a man named Samuel Wilson. Sam Wilson was a meat packer in Troy, N.Y. During the war of 1812 he supplied barrels of meat to the soldiers. The barrels were stamped with the initials of the company and also the letters US. The soldiers of the time equated their United States supplied rations with 'Uncle Sam' Wilson. From there the story grew to the somewhat fictional 'Uncle Sam Wants You' character familiar to us today.

## **David Shafer, Division of Hydrologic Sciences**

David Shafer is the Director of the Center for Environmental Remediation and Monitoring (CERM) at DRI. He joined DRI in 1998 after working 10 years for the Department of Energy in Washington, DC and at the Hanford Site in Washington State. He earned a PhD in Geosciences and Quaternary Sciences at the University of Arizona in 1989. His research interests are primarily related to environmental remediation of contaminated soil and water, as well as restoration of natural environments. David has been involved with the CEMP since 1999 when he helped write the proposal for DRI to manage the program. He has had a long interest in involving the public in environmental data collection and decision making that was honed when he was a ranger for the National Park Service in the 1980s. If he is surfing the web at work, it is probably to check the latest baseball scores or to find a new trail to hike on the weekend.

## **Jeffrey Tappen, Division of Hydrologic Sciences**

Mr. Tappen is a health physicist with the Desert Research Institute, and provides radiological and risk analysis support to various programs, including the Community Environmental Monitoring Program (CEMP), the DOE Test Control Panel. Mr. Tappen has over 35 years experience as a health physicist, and worked on the Yucca Mountain Project for 16 years prior to coming to DRI.