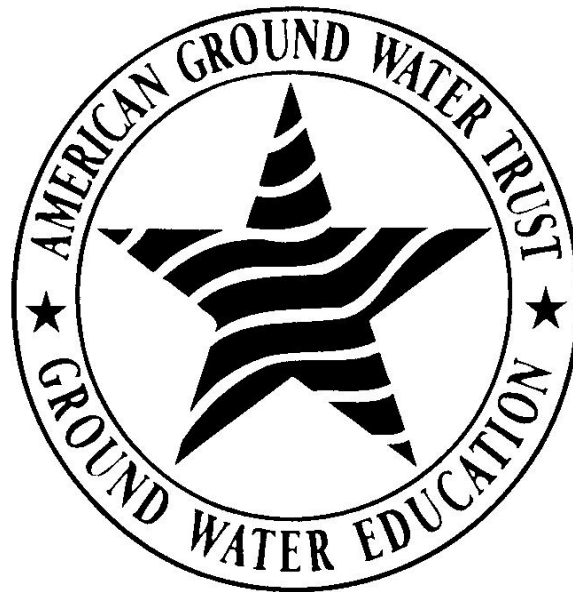


# AQUIFER STORAGE RECOVERY IN THE US: National Status of Projects, Issues and Solutions

Holiday Inn Select, Orlando Airport, Florida  
September 28 and 29, 2009

## Conference Program



**American Ground Water Trust  
50 Pleasant Street  
Concord, New Hampshire 03301**

**Telephone: (603) 228-5444**

**Fax: (603) 228-6557**

**E-mail: [trustinfo@agwt.org](mailto:trustinfo@agwt.org)**

**Website: [www.agwt.org](http://www.agwt.org)**

CONFERENCE SPONSORS



Southwest Florida Water Management District, Brooksville, FL



Saint Johns River Water Management District, Palatka, FL



Applied Drilling Engineering Inc., Tampa, FL



Layne Christensen, Milwaukee, WI



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**Ranney Collector Wells, Columbus, OH**  
**Parker Dominick Hunter, Charlotte, NC**  
**Watercat Consulting, LLC, Washington DC**  
**USGS - FL Integrated Science Center, St Petersburg, FL**

ASR 9 CONFERENCE OBJECTIVE IS FOR A CRITICAL REVIEW AND ASSESSMENT OF:

#### ASR - STATE OF THE ART AND ECONOMICS

- Recharging of aquifers (subsurface storage for later use) is a rapidly increasing and vital water management strategy throughout the world.
- Aquifer storage technology has the capability of providing high benefit water projects that have manageable risks and little or no adverse environmental impacts.
- The design, construction and operation costs of ASR water storage options are very cost effective alternative water supply sources that are typically many times less expensive than surface storage options or desalination projects.
- Public health, groundwater quality and the subsurface environment can be protected by properly sited, designed and operated ASR systems.
- ASR technology continues to benefit from innovations in well design, water treatment, monitoring and analytical capabilities.

#### ASR - OPERATIONAL AND TESTING EXPERIENCE

- Initial operation of an ASR site in some areas may result in temporary increased mobilization of naturally occurring metals in the storage zone; several operational schedules have demonstrated that continuous improvement over multiple years of use can achieve the drinking water standards.
- Formation and maintenance of a buffer zone around an ASR well is a proven and cost-effective approach for rapidly achieving high recovery efficiency and ensuring acceptable recovered water quality.
- Natural improvements in recharge water quality that occur underground can provide a more cost effective and “greener” solution than above ground pre-treatment.
- Cycle testing and operational computer models are providing increasingly accurate numerical predictions of recovered water quality that can be used to effectively manage low level risks.
- Increasing knowledge of chemical process action (recharge water/ aquifer matrix and native water) in the subsurface for metals and disinfection by-products provides operational management strategies that can produce recovery water of predictable quality.

#### ASR - REGULATORY ISSUES

- The application of ASR technology throughout the country will benefit from having some consistency in the requirements for testing, monitoring and operational protocols.
- The uncertainty related to regulatory compliance and operational permits is a constraint on “shovel-ready” recharge projects that would help solve supply problems for many communities.
- The regulatory framework for ASR should reflect a risk-based evaluation of the associated benefits and costs.
- When appropriate, compliance with standards for disinfection-by-products, microorganisms, and naturally occurring metals that improve during ASR cycles should be evaluated at a monitor well network that provides the distance and time for any natural subsurface treatment processes that occur in the storage zone.
- There is a need for a federal ASR regulatory framework with flexibility to accommodate the different needs, constraints and opportunities in each state. This could be achieved through establishment of a UIC Class VII category for ASR wells, reflecting their beneficial use for achieving water supply reliability and security. The responsibility for regulation of Class VII wells could be delegated to states.

Program - Monday, September 28th

7:30 – 8:30 REGISTRATION

Session One 8:3 – 10:00

Moderator: Andrew Stone

8:30 – 9:00 Andrew Stone, American Ground Water Trust, Concord, NH

**WELCOME, INTRODUCTION AND BACKGROUND TO THE CONFERENCE**

- ◆ RECOGNITION, OF SPONSORS, EXHIBITORS, ORGANIZING COMMITTEE AND FIELD TRIP LEADERS
- ◆ BACKGROUND TO THE DEVELOPMENT OF THE 2009 PROGRAM AND EXPECTATIONS FROM THE CONFERENCE
- ◆ AGWT POSITION ON AQUIFER STORAGE AS A WATER MANAGEMENT STRATEGY

*Andrew Stone is the Executive Director of the AGWT. He is a hydrogeology graduate from London University with additional academic qualifications in education, geography and geology. He has over thirty five years of ground water experience in Africa and the U.S. as a university professor, ground water consultant and ground water advocate & educator. He has first-hand experience of ground water exploration, well design and source protection in a wide variety of geologic environments. As the director of the Trust's education programs he has coordinated over forty conference programs related to aquifer management, Aquifer Storage Recovery, conjunctive use, water banking and well design..*

9:00 – 9:30 Florida State Representative Trudi Williams, (District 75), Tallahassee, FL

**Keynote Presentation**



**WATER SUPPLY ISSUES AND WATER POLICY IN FLORIDA**

*Rep. Trudi Williams, District 75, was first elected to the Florida House in 2004. She serves as Chair of the Agriculture & Natural Resources Policy Committee, is a member of the General Government Policy Council, the Health Care Services Policy Committee, the Natural Resources Appropriations Committee and the Select Policy Council on Strategic & Economic Planning. She is a resident of Fort Myers, a graduate from Florida International University, (B.S.C.E), and is a Civil/Environmental Engineer by profession. She is founder and C.E.O. of TKW Consulting Engineers, Inc., Orlando.*

*Trudi Williams is the Lower West Coast Water Supply Plan Advisory Committee, Chairperson, a former Chair and Governing Board Member of the South Florida Water Management District, and was the 2003-2004 Environmental Director of the Florida Institute of Consulting Engineers.*

9:30 - 10:00 Edward J. Bouwer, Johns Hopkins University, Baltimore, MD

**Keynote Presentation**

**A NATIONAL PERSPECTIVE ON WATER RESOURCE ISSUES: FOCUS ON AQUIFER STORAGE**

[The presentation includes an update on the impact of the 2008 National Academy Report on Prospects for Managed Underground Storage of Recoverable Water: What parts of the report are people reading? Where are the main points of guidance that will help with aquifer storage implementation? What feed-back has there been from the report?]



*Dr. Bouwer served as Chair of the National Academy of Sciences Committee that prepared the 2007 report "Prospects for Managed Underground Storage of Recoverable Water." Dr. Bouwer has MS and Ph.D. degrees from Stanford University, Stanford, CA. He is a Professor in the Department of Geography and Environmental Engineering at the Johns Hopkins University and has extensive experience with microbial process engineering and bioremediation processes. Dr. Bouwer's research interests encompasses factors that influence biotransformation of contaminants, bioremediation for control of contaminated soils and groundwaters, biofilm kinetics, biological processes design in wastewater, industrial, and drinking water treatment, and transport and fate of microorganisms in porous media. He has (co) authored over 150 refereed journal articles, conference proceedings, book chapters, and technical reports.*

**10:00 -10:30 David Pyne, ASR Systems LLC, Gainesville, FL**

**ECONOMICS OF SOLVING WATER MANAGEMENT NEEDS WITH AQUIFER RECHARGE TECHNOLOGY**

[The presentation will outline where ASR fits within the whole spectrum of aquifer recharge. It will detail ASR costs compared with other engineering/ water management options. ASR can save \$billions for water infrastructure at the national level, and produce sustainable solutions to pressing supply issues by increasing options for water managers.]

*David Pyne is the President of ASR Systems LLC, Gainesville, Florida. He has pioneered development of ASR technology during the past 30 years and has directed or provided technical consultant assistance during development of about half of the 95 operating ASR wellfields in the United States, including 10 of the 13 ASR wellfields in Florida. He is a civil engineer with extensive national and international experience, and is the author of the only book published on ASR, the second addition of which was released in 2006.*

**10:30 – 11:00 BREAK**

**Session Two 11:00 – 12:15  
Moderator: David Moore**

**11:00 - 11:15 David Moore, Executive Director, Southwest Florida Water Management District, Brooksville, FL**

**OVERVIEW OF SWFWMD WATER ISSUES**

**11:15 - 11:45 Jennifer E. Closshey, Ideas & Innovations, Inc., Plant City, FL**

**WATER ISSUES IN FLORIDA: A BUSINESS PERSON'S PERSPECTIVE**

[The presentation will include an overview of industrial water usage in the state compared to other types of users. Provide background and history of industrial water usage in Florida. Outline the roles and expectations of the various agencies involved in water matters for industry and discuss future projections of water use in Florida and the issues that affect industry users.]

*Jennifer is president, CEO, and owner of Ideas & Innovations, Inc., a strategic business consulting firm. Her experience with water is personal and professional, agricultural and industrial, and residential and business. Closshey was appointed to the Southwest Florida Water Management District Governing Board in April 2005. She was elected Board treasurer in May 2006 and in May 2008, she was elected Board secretary. Closshey is also the chair of the Alafia River Basin Board. The Alafia Basin is located in the southern half of Hillsborough County and the southwestern portion of Polk County*

*She received Bachelor of Arts degrees in both marketing and business administration from the University of South Florida. She is a licensed Florida Real Estate Broker. She has been a member of the Greater Plant City Chamber of Commerce since 1976, and is a member of the Florida Chamber of Commerce Leadership Florida.*

**11:45 – 12:15 John Powers, CH2M Hill, Tampa, FL**

**TWO DAYS IN CHICAGO: WHAT HAPPENED AT THE “ASR EXPERTS MEETING”?  
WHAT NEEDS TO HAPPEN NOW?**

[In May, 2009, the USEPA Underground Injection Control Program hosted a meeting of experts on Aquifer Storage Recovery in Chicago. The purpose was to "generate innovative ideas and individual input from participants". Over 60 ASR experts attended the meeting, representing all sectors of the water community. This presentation will briefly summarize the format of the meeting, identify key issues discussed, explain the EPA's understanding of the issues facing ASR nationally and present possible solutions acceptable to the EPA that will satisfy the tenets of Safe Drinking Water Act while allowing ASR to move forward as a key technology in water resources development.]

*John Powers is a senior hydrogeologist and project manager involved with many aspects of groundwater resources and reuse. John is also the reuse technology leader for the southeast United States for CH2M HILL. He has 19 years experience and is a Board Member of WateReuse Florida, the state chapter of the WateReuse Association. John has specialized in all aspects of ASR, DIW and wellfield projects and was the lead scientist for the first reclaimed water ASR system in Florida. John has presented papers at more than a dozen conferences and seminars and has played a leading role in advocating for the expansion of ASR and reuse in Florida. He received a B.S. in Geology from Queens College and a M.S. in Geology from USF. He has been a registered professional geologist in Florida since 1994.*

**12:15 – 1:15 LUNCH**



Moderator: Tim Parker

**1:15 - 1:45 Tim Parker, Parker Groundwater, Sacramento, CA**

**THE STATE BY STATE “ASR REGULATORY SMORGASBORD” IN THE US**

[The presentation reviews nation-wide variations in the application of regulatory oversight for ASR projects. It outlines what can be learned about ASR technology and regulations from the Internet and makes a case for common national criteria regarding recharge sources, testing protocols, notification requirements etc.]

*Mr. Parker's groundwater experience spans more than 25 years and includes groundwater resources development, groundwater management, groundwater monitoring, water policy analysis, and contaminant hydrogeology in public and private sectors. He was previously with Schlumberger Water and Carbon Services, and prior to that with the California Department of Water Resources in the Conjunctive Water Management Program. He is a California Professional Geologist, Certified Engineering Geologist, and Certified Hydrogeologist. Mr. Parker serves the American Ground Water Trust as Board Chair, the Groundwater Resources Association of California as a Director and Legislative Committee Chair, and the California Groundwater Coalition as Director. Additionally, Mr. Parker serves as a Director on the National Ground Water Association-Ground Water Scientists and Engineers Division and is actively engaged in the Association of California Water Agencies Groundwater Committee current efforts to develop a strategic framework for sustainable groundwater management in California.*

**1:45 – 2:15 Stephanie J. Moore, Daniel B. Stephens & Associates, Inc., Albuquerque, NM**

**AQUIFER STORAGE PROJECTS IN THE SOUTHWEST:  
TECHNICAL, ECONOMIC AND REGULATORY PERSPECTIVES**

[The presentation includes a review of selected fully matured, newborn and nascent projects in Arizona, Nevada, New Mexico, Wyoming and California, an assessment of whether regulatory requirements encourage or inhibit nascent projects from becoming fully developed, and a consideration of stormwater runoff as a resource for aquifer recharge.]

*Stephanie Moore is a Senior Hydrologist with twelve years of experience in water resources investigations. She has an M.S. in Earth and Planetary Sciences from UNM (University of New Mexico) and a B.S. in Environmental Sciences from TCU (Texas Christian University). Ms. Moore spent the first eight years of her career with the USGS, where her research topics included stream-aquifer interactions, vadose-zone processes and water quality, with a focus on natural recharge processes in arid environments. Since 2005, she has worked for Daniel B. Stephens & Associates, Inc., where she uses her technical skills to help local and state governments identify and implement practical water resources management solutions. She serves on two advisory boards for water resources planning, and is an active volunteer in Water For People's World Water Corps.*

**2:15 – 2:45 Said Amali, Amali Consulting LLC, Beaverton, OR**

**UMATILLA BASIN, OREGON - AQUIFER RECOVERY ASSESSMENT PROJECT**

[The Umatilla recharge project takes 100,000 acre feet/ year (90MGD) from the Columbia River for aquifer storage. The project demonstrates the feasibility of large scale recharge elsewhere in the US. The presentation describes the project and the strategy used to get stakeholder cooperation (regulators, irrigators, Indian tribes, and environmental groups) and interagency cooperation among the Department of Water Resources, (water right for diversion), Department of Environmental Quality, (recharge water quality), Fish and Wildlife Department, (aquatic habitat), Indian Tribes, (treaty obligations) and the Division of Health, (drinking water standards).]

*Dr. Said Amali has more than fifteen years of experience in water resources evaluations/planning and environmental quality impact assessments/mitigation. He is the project manager for the Umatilla Basin Regional Aquifer Recovery Assessment. Other projects have included water and watershed planning programs, wastewater reuse, and environmental compliance services for a broad range of contamination scenarios. He previously worked for the consulting firms Kennedy-Jenks and IRZ. He has a PhD from UC Davis (1993) and is a registered engineer in OR and WA.*

**2:45 – 3:00 BREAK**

Session Four 3:00 – 5:00

Moderator: Mark McNeal

**3:00 – 3:30 June Mirecki, US Army Corps of Engineers, Jacksonville, FL**

**KISSIMMEE RIVER ASR PILOT:  
AN ENVIRONMENTAL ASR SYSTEM FOR MULTI-YEAR SUB-SURFACE STORAGE**

[The Kissimmee River ASR pilot site is designed as a 5-MGD system to provide storage for "environmental" (ecosystem restoration) water needs. Instrumentation and data capture make this one of the most advanced ASR study sites in the world with real-time monitoring supplementing an extensive monitoring program. The results from the program regarding arsenic mobilization and attenuation, now in stage 2 cycle testing, will likely play an important role in policy decisions for Everglades's restoration.]

*June Mirecki has served as a technical team member on ASR systems in Charleston SC and Florida since 1994, on projects with the US Geological Survey, Southwest Florida Water Management District, and the Army Corps of Engineers. Her technical areas of research are ground-water geochemistry and geochemical modeling, particularly during ASR cycle testing. Currently she is the technical lead for ASR projects in the Corps of Engineers. She earned a Ph.D. in geochemistry from University of Delaware back in the Paleocene. She is P.G. in Florida, and an associate editor for Applied Geochemistry and the Journal of Environmental and Engineering Geoscience.*

**3:30 – 4:00 Jason Mills, CDM, Maitland, FL**

**RECLAIMED WATER FOR 21 MGD BISCAYNE AQUIFER RECHARGE**

[The presentation describes a recharge project that increases regional water availability by reclamation and reuse and reduces volumes of deep injection disposal. The project includes advanced wastewater treatment technologies (microfiltration, reverse osmosis, and UV with peroxide); and has aquifer recharge options by moat at Miami Dade County Metro Zoo, infiltration trenches or injection wells. The project design and operation plans are in compliance with water use permit conditions.]

*Jason Mills is a Project Geologist, has worked with CDM for 10 years and is based in Maitland, Florida. He has been actively involved in two Central Florida ASR projects that are currently under construction by CDM. He has over 115 years of field experience serving as a senior hydrogeologist for water resource projects involving production well rehabilitation, construction, and wellfield expansion in northeast and central Florida. Mr. Mills obtained a B.S. in Geology at the University of Florida in 1985 and is Professional Geologist registered in the state of Florida*

**4:00 – 4:30 Mark Pearce, Entrix Water Solutions, Ft Myers, FL**

**IMPACTS OF LIMITING ASR BUBBLE GROWTH AND A CHEMICAL APPROACH TO ELIMINATING ARSENIC MOBILIZATION IN THE SUBSURFACE**

[The first presentation topic is based on recent proposed action by the Florida Department of Environmental Protection to limit the size or total storage volume of ASR "bubbles." This requirement defies the basic principle upon which a successful brackish water ASR system is based. The second topic is based on the implementation of Le Chatelier's principle, requiring that the chemical nature of ASR injected water approach that of the native formation water. Geochemical modeling shows that only one commonly available chemical is capable of accomplishing this task for pyrite bearing formations.]

*Mark Pearce, is Vice President, Entrix Water Solutions, Cape Coral. Dr. Pearce graduated from Washington State University with a Ph.D. in Chemical Physics. Dr. Pearce has 32 years of professional experience with 28 years of experience in the fields of subsurface flow investigations, deep well disposal, and aquifer storage and recovery (ASR). He has developed a unique vision of how ASR systems work and has developed some of the most successful brackish ASR programs in the country. Dr. Pearce has used his experience in chemistry, physics, and environmental science to develop new approaches that meld regulatory and operational requirements and increase ASR well and wellfield efficiencies. He has recently introduced a new and less costly method for preventing arsenic mobilization in the subsurface due to pyrite dissolution*

**4:30 – 5:00 Mark McNeal, ASR-US, LLC, Tampa, FL**

**REVIEW AND ASSESSMENT OF THE STATUS OF ARTIFICIAL RECHARGE IN FLORIDA**

[The review will include recharge projects that are complete and operational, projects in the testing phase, projects that are proposed and projects that have been shelved, delayed or abandoned. Could a change in regulation or a change the way in which regulations are interpreted increase project implementation in Florida?]

*Mark McNeal is the CEO, ASRus, LLC. Prior to founding ASRus, Mr. McNeal was with CH2M Hill in their Tampa, FL, office for 21 years. While with CH2M Hill, Mr. McNeal served as Reuse Practice Leader and Groundwater Practice Leader for their Southeast Region. He has been Project manager for numerous ASR, injection well, water supply wells, and reuse systems throughout Florida. Mr. McNeal is actively involved with several potable water ASR programs, including the City of Tampa and the Peace River Facility. Mr. McNeal has had significant involvement with the all four reclaimed water ASR systems that have undergone operational testing in Florida, including assisting the Englewood Water District with obtaining the first operating permit for a reclaimed water system in Florida. Mr. McNeal's firm is also part of the team tasked with implementation of a 50 mgd ASR system near Lake Okeechobee as part of the Lake Okeechobee & Estuary Recovery (LOER) program.*

**5:00 – 6:30 RECEPTION with cash-bar**

**Advance Notice about ASR 10 – Orlando, October 2010**



**ASR 10  
2010**



**The American Ground Water Trust's tenth annual ASR program in Florida will be held in conjunction with the Annual Meeting of the American Institute of Professional Geologists and the Florida Association of Professional Geologists**

**All participants at ASR 9 will receive conference announcements about the 2010 event.**

**Program - Tuesday September 29<sup>th</sup>**

**Session Five 8:30 – 10:30**

**Moderator: David Pyne**

**8:30 – 9:00 Mark Lucas, CH2M Hill, Philadelphia, PA**

**NATIONAL REVIEW AND ASSESSMENT OF US ASR PROJECTS**

[A 2009 survey to assess the operational status of ASR facilities and operator satisfaction revealed that operators were overwhelmingly positive in regard to the application of ASR. However, over years of operations, several individual systems have failed, while others offer long-term, maintenance difficulties. The single most common challenge identified in clastic storage aquifers of the Northeast and Southwest was well clogging by total suspended solids (TSS) loading to the well screen and gravel pack. In the Northeast, groundwater systems often contain elevated sequestered iron concentrations up to 0.5 mg/L representing a significant source of solids. Other operational issues include the declining availability of recharge water (Southwest), equipment problems (every region), elevated turbidity (Northeast), and elevated iron/manganese (Northeast, Northwest).

*Mr. Lucas works as a Senior Hydrogeologist in CH2M HILL's Philadelphia office. He has served as a project manager, or technical leader on ASR projects in the Atlantic Coastal Plain since 1989. He has published numerous papers on ASR technology specializing in water/aquifer interactions in regard to iron, manganese, radionuclides, and clay minerals, along with numerous papers on clogging in ASR wells. Mr. Lucas is presently the Regional Technology Leader for Groundwater in CH2M HILL's Northeast Region.*

**9:00 – 9:30 Adam Hutchinson, Orange County Water District, Fountain Valley, CA**

**THE VITAL ROLE OF RECYCLED WATER IN BASIN-WIDE ASR, ORANGE COUNTY, CA**

[Over the past 70 years, the Orange County Water District has developed a large, basin-wide aquifer storage, recovery system that has effectively doubled the yield of the groundwater basin. Sources of water used to recharge the basin have evolved through time, with recycled water becoming more and more important as the availability of imported and local supplies become less reliable. Working closely with and developing partnerships with the regulatory and scientific community on the safety and suitability of using recycled water for recharge has allowed OCWD to greatly expand the use of recycled water for recharge, most recently with the completion of the 70 mgd Groundwater Replenishment System.]

*Adam Hutchinson is Director of Recharge Operations for the Orange County Water District. Prior to working at the District, Adam spent seven years as a Senior Hydrogeologist for CH2M HILL working on a wide variety of water resources projects, with most having an artificial recharge component. He has an undergraduate degree in Geology and a master's degree in Hydrology from the University of Arizona.*

**9:30 – 10:00 Tony Morgan, United Water Conservation District, Santa Paula, CA**

**82 YEARS OF AQUIFER RECHARGE IN VENTURA COUNTY, CALIFORNIA:  
ECONOMICS, TECHNOLOGY, REGULATION AND LONG-TERM FUTURE CHALLENGES**

[United Water Conservation District's early mission (founded in 1927) was to manage and preserve water resources to support extensive agricultural operations in the Santa Clara River Valley and the adjacent Oxnard Plain. While the modern mission has evolved to include elements of aquifer recharge and storage via spreading basins and injection wells, overdraft mitigation, surface-water storage and diversion, seawater and saline water intrusion control, and ecological and potable water supply, maintaining economically viable agricultural operations remain at the heart of the operation.]

*Tony Morgan brings 30 years of experience to the Groundwater Department Manager position at United Water Conservation District. His professional experience has included many aspects of water resources (e.g., groundwater exploration, resource development, water supply management, ASR facility feasibility and pilot-scale testing programs, water quality assessments, regulatory compliance) and is currently responsible for groundwater resource management activities in seven groundwater basins within UWCD. The Groundwater Department is involved with hydrogeological investigations to support recharge operations, monitoring and mitigation of seawater intrusion along the coast and saline waters from inland locations, in lieu water supplies for area agricultural and municipal operations, and maintenance of a regional groundwater flow model. Mr. Morgan received his Bachelors and Masters degrees in Geology from Indiana University, holds the Professional Geologist and Certified Hydrogeologist credentials in the State of California, and serves on the Board of Directors of the American Ground Water Trust. Most recently, Mr. Morgan was the Western Regional Manager for Layne GeoSciences (a division of Layne Christensen Company).*

**10:00 – 10:30 Bruce Narloch, MWH, Bellevue, WA**

**A TOXICOLOGIST'S PERSPECTIVE ON HEALTH-RISK ISSUES FREQUENTLY RAISED IN CONNECTION WITH  
AQUIFER RECHARGE**

[Regulations related to permitting and operation of aquifer recharge projects are mostly based on health issues. In the overall context of national water quality standards, this presentation will consider the basic principles and methods that are the basis for risk assessment and will review these with reference to potential "endangerment" in stored recharge water.]

*Bruce Narloch is the Director of Risk Assessment Services for MWH Americas. Dr. Narloch is a Board Certified Toxicologist with more than twenty years of experience in the areas of toxicological evaluations, public health & environmental risk assessment, and regulatory compliance. He has conducted more than 200 public health risk assessments on chemical and biological contaminants in water supply systems including groundwater aquifers, drinking water reservoirs, and municipal treatment and delivery systems throughout the United States and abroad. Dr. Narloch has been a guest lecturer at universities and research foundations, and is a co-author of the report, National Assessment of Perchlorate Contamination Occurrence, prepared for the American Water Works Association Research Foundation.*

**10:30 – 11:00 BREAK**

Moderator: Chuck Drake, TetraTech, Orlando, FL  
President, Florida AIPG

**11:00 – 11:30 Dana Gaydos, Schreuder Inc, Tampa, FL**

**WETLANDS ON MINED PHOSPHATE LANDS CAN NATURALLY TREAT STORMWATER, PRODUCING LOW DISSOLVED OXYGEN RECHARGE TO THE FLORIDAN AQUIFER**

[Florida's mined phosphate areas have many post mining areas where wetlands have been created per design or by colonization and leave deposits of tailing sands that can be used for filtration. Storm water runoff detained for as little as 10 days in wetlands produce dramatically reduced DO. The lab testing of recharge water from the study site in Polk County showed different rates of release of arsenic with different source waters into rock cuttings from different aquifers. Groundwater modeling shows that recharge at a rate of 1 MGD for 30 years will be contained on-site.]

*Ms. Dana Gaydos has worked as an environmental scientist for Schreuder, Inc. since 2002. She received a B.S. degree in biology with a minor in chemistry from the University of North Carolina at Wilmington and a Master's degree in Marine Science specializing in biogeochemical modeling from the University of South Florida in St. Petersburg. At Schreuder, she has managed an ongoing research project testing the feasibility of wetlands and tailing sands filter basin on previously mined phosphate lands to naturally treat industrial wastewater, treated effluent, storm water and captured surface waters to meet drinking water standards for injection in the Floridan Aquifer, which is now defined as the Aquifer Storage and Recovery Program (ARRP) concept.*

**11:30 – 12:00 John Lisle, U.S. Geological Survey, St. Petersburg, FL**

**BUGS IN THE WATER:  
MICROBIAL ECOLOGY STUDIES IN THE UPPER FLORIDAN AND BISCAYNE AQUIFERS**

[The presentation reports on the deployment of diffusion chambers into the Upper Floridan Aquifer with live laboratory-grown bacteria. (Probably the first time this has been permitted in the US). The project focus is on "following the carbon" in the native waters and determining how active the native bacterial populations are while characterizing the carbon that is in both aquifers. ]

*Dr. Lisle earned his Ph.D. from University of South Florida's College of Public Health in 1996. He completed a post-doctoral fellowship in Gordon McFeter's laboratory at Montana State University's Department of Microbiology and held a research professor's appointment in the Microbiology Department and NSF sponsored Center for Biofilm Engineering also at Montana State University. Dr. Lisle was employed by NASA's Astrobiology Institute at Johnson Space Center in Houston, TX where he worked as a microbial ecologist and conducted research in extreme environments, including Antarctica. In 2002 Dr. Lisle starting working with the USGS Center for Coastal and Watershed Research in St. Petersburg, FL, where he is working with federal, state and academic groups on microbial ecology issues associated with water quality and quantity in Florida. His expertise is in the use of non-culture based and molecular techniques to assess the role microorganisms play aquatic systems.*

**12:00 – 12:30 Claude D. Tankersley, Director of Public Works, City of Bradenton, Bradenton, FL**

**PAST, PRESENT AND FUTURE OF THE BRADENTON ASR DEGASIFICATION PROJECT**

[The presentation reviews eight intensively monitored cycle tests completed since 2003. It will explain the pre-treatment system to remove dissolved oxygen and oxidants from recharge water and describe the equipment design configurations to maximize effectiveness of arsenic reduction.]

*Claude D. Tankersley, P.E., serves as the Director of Public Works and Utilities for the City of Bradenton. A graduate of the University of Florida's College of Civil Engineering, Mr. Tankersley earned his Master's degree in groundwater studies. Prior to joining the City of Bradenton, Mr. Tankersley spent 18 years as a water resources consultant and Vice President of Jones, Edmunds & Associates. Mr. Tankersley has managed ASR projects from conception through testing for both potable and reclaimed water systems. Mr. Tankersley has been involved on the Bradenton ASR project since its inception in 1997; he is one of the remaining original team members still involved, along with Don Ellison, P.G. and Seth Kohn, P.E.*

**12:30 – 1:15 LUNCH**



1:15 – 1:45

**Special Guest introduction: Andrew Stone**

**Professor Y. Venkatarami Reddy, Sri Venkateswara University, Tirupati, India**  
**ASR CAN MAKE INDIA'S GROUNDWATER SUSTAINABLE AND IMPROVE WATER QUALITY**



[This presentation will give an overview of India's water resource challenges and the economic significance of aquifer recharge as a solution. It will include an explanation of the principal techniques used for recharge and recovery and a summary of regional and local legislation and regulations related to aquifer storage. The presentation will conclude with an assessment of the potential growth of aquifer storage recovery projects to achieve sustainability of water supply in India.]

*Professor V. Reddy obtained a M.Sc. Geology in Sri Venkateswara University in 1979. He became actively involved with applying hydrogeology and remote sensing in the planned development of water resources for public supplies, irrigation and industrial use in the semiarid tracts of Rayalaseema, Andhra Pradesh, India. He obtained his Ph.D. from studies of the land and water resources of a backward region in Rayalaseema in relation to the import of Krishna River water. Nine students have submitted Ph.D. under him on various water problems, while four students are presently pursuing research.*

*He has been active in the University administration since 2005 in various capacities including Special Officer of the newly formed Vemana University at Kadapa and Executive Member and Registrar of Sri Venkateswara University at Tirupati. He recently started an extension wing in Sri Venkateswara University to tackle the twin problems of groundwater shortages and deterioration of water quality crippling the national economy by taking the best available international expertise in the field.*

**Session Seven**

**1:45 – 4:00**

**Moderator: Don Ellison**

**1:45 – 2:15 Kevin G. Rein, Colorado Division of Water Resources, Denver, CO**

**AQUIFER RECHARGE IN COLORADO**

[The presentation provides a review of the status of aquifer storage projects in the Denver Basin and Front Range. It explains how state agencies handle aquifer recharge permits and approvals, the significance of ASR as a water management option for solving water problems in Colorado and the impact of Colorado water law on ASR & conjunctive use water management.]

*Mr. Rein is the Assistant State Engineer, Intrastate Water Supply and Litigation, in the Denver office of the Division of Water Resources; also known as the State Engineer's Office. In addition to providing support to the State Engineer on general Division matters and special projects, he manages, and is directly involved with the teams that perform well permitting, subdivision water supply review, substitute water supply plan review, water court activity review, and numerous other items associated with the administration of surface and ground water in the state. Kevin is a native of Colorado, a registered professional engineer in the state, and has worked for the Division of Water Resources in the Water Supply section for the past eleven years.*

**2:15 – 2:45 Barbara Priest, Oregon Department of Environmental Quality, Portland, OR**

**AQUIFER RECHARGE IN OREGON**

[The presentation gives an update on the status of Oregon's aquifer recharge projects (97 permitted recharge wells), an explanation of the ASR project approval application process, the criteria used by Oregon state agencies for ASR permits and projected trends for ASR permit applications in Oregon.]

*Barbara Priest is the UIC Program Coordinator for Oregon's DEQ-Water Quality Division. She has a BS from University of Nevada, McKay School of Mines and an MS from Portland State University, Oregon. She has been working to protect Oregon's drinking and surface water at DEQ since 1990. Her prior positions at DEQ include work as a Senior Watershed Coordinator (Willamette River Study), 401-C Certification Coordinator, Non point Source Coordinator and Wellhead Protection Coordinator (now called Drinking Water program or Source Water). Since 1999, Barbara has been coordinating the UIC program for DEQ's Water Quality Division. Prior to joining the Oregon DEQ Barbara worked for Hahn and Associate, as an Environmental Auditor, for Multnomah County Environmental Services as a Long Range Planner, for the Bureau of Land Management as a Long Range Planner and Mineral Program Coordinator (geothermal and non energy minerals), and for VTN, Oregon as a Project Coordinator and Marketing Manager.*

**2:45 – 3:15 Mike Sufilita, Utah Division of Water Resources, Salt Lake City, UT**

### **AQUIFER RECHARGE RECOVERY IN UTAH**

[Utah is the second driest state in the US. The presentation reports on the dozen ASR projects in the state that are completed and operational, undergoing pilot testing or under investigation. Increasing demands for water have put ASR technologies to the forefront of water management strategies for Utah and have resulted in increased cooperation among water providers, water uses and regulatory authorities.]

*Mike Sufilita is a Senior Engineer at the Utah Division of Water Resources. He is the primary author of the 2005 Utah publication, Conjunctive Management of Surface and Ground Water in Utah. Since then he's worked throughout the state encouraging and assisting ASR project implementation. The number of projects has increased from three to ten. The ASR work is one part of his total duties. From 1995 to 2003 he was a hydrologist with the Utah Division of Oil, Gas & Mining. That work prevented and mitigated damage to ground water aquifers from coal mining operations. While there he developed a correlation between natural spring flows and the Palmer Hydrologic Drought Index. From 1972 to 1995 he completed numerous engineering projects while with private firms, the U.S. Air Force and IBM Corporation. Mike has a BES in Civil Engineering from Brigham Young University and is a Professional Engineer.*

**3:15 – 3:45 Joe Haberfeld, Florida Dept of Environmental Protection, Tallahassee, FL**

### **AQUIFER RECHARGE IN FLORIDA**

[The presentation will provide an update on Florida's regulatory approach to arsenic mobilization in aquifer recharge projects (99 permitted ASR wells plus proposed recharge projects); ASR permit application process; off-site migration concerns; and an overview of monitoring results for ASR in Florida]

*Joe Haberfeld is the UIC Program Manager at the Florida Dept of Environmental Protection. He is a hydrogeologist and Professional Geologist with the Florida Department of Environmental Protection (DEP) in Tallahassee, Florida. He has worked all aspects of utilizing deep injection wells for wastewater disposal and aquifer storage and recovery in Florida, including hydrogeologic evaluation, well construction methods, ground water monitoring, permitting and compliance. He serves as the Program Manager DEP Underground Injection Control Program.*

*Prior to joining DEP, he worked for 9 years as a petroleum geologist for Gulf Oil and Chevron in the Gulf Coast and Permian Basin in the areas of development, exploration and enhanced oil recovery. He was educated at the State University of New York at Fredonia (B.S. Geology, 1975) and Southern Illinois University (M.S. Geology, 1977).*

**3:45 – 4:00 Donald Ellison, Southwest Florida Water Management District, Brooksville, FL**

### **CONFERENCE SUMMARY – CONCLUSIONS AND ADJOURN**

**[Discussion and wrap-up comments from participants]**

*Mr. Ellison has managed ASR projects and research efforts for the Southwest Florida Water Management District (District) since 1993. Acting as liaison between the District and over 14 water suppliers/utilities he helped develop and establish District funding for ASR projects that have resulted in approximately 50 ASR wells throughout the District. He manages several ASR research projects performed by the United States Geological Survey, University of Florida, Florida Geological Survey, University of South Florida, and various consultants. These projects focused on die off of microorganisms in the aquifer, mobilization of arsenic in the aquifer, bench scale arsenic mobilization studies, arsenic mobilization modeling, detailed ASR monitoring projects and pre-treatment of injection water to minimize arsenic mobilization. He has been a participant on the Florida Department of Environmental Protection's Underground Injection Control work group and attended the EPA's ASR expert meeting in May 2008 in Chicago. Prior to the District he worked in the Northeast on Superfund site assessment and remediation projects. Mr. Ellison received his B.S. in Geology from the University of Cincinnati and his M.A. in Geology from Boston University.*

## **NATIONAL INVENTORY OF US AQUIFER RECHARGE SITES**

AGWT will soon be posting on its web-site ([www.agwt.org](http://www.agwt.org)), a listing of USA Aquifer Recharge Projects/ Sites. This listing will include ASR projects in addition to those sites where there is any form of artificial recharge that can be considered under the broad heading of aquifer management. The information collected will be made freely available. The data details for each site that we plan to list are:

- ◆ **State/ Province**
- ◆ **Project Name (If it has one)**
- ◆ **Location (Owner/ Utility)**
- ◆ **Status (pilot/ operating since ...)**
- ◆ **Purpose (use for recovered/ recharged water)**
- ◆ **Recovery volume (actual or projected gpd)**
- ◆ **Geology (lithology of storage zone)**
- ◆ **Recharge mechanism (basins/ wells)**
- ◆ **Source water (reuse/ storm/ surface)**
- ◆ **Link to additional web-based information**
- ◆ **Contact person for project**

We will be pleased to have additional and updated information. Please e-mail to [trustinfo@agwt.org](mailto:trustinfo@agwt.org)