WATER SUPPLY SYSTEMS WORKSHOP

American Ground Water Trust Program – November 14, 2016
The Centre at Sycamore Plaza, 5000 Clark Avenue, Lakewood, CA 90712

MAXIMIZE SUPPLY FROM WELLS BY CORRECT DESIGN, OPERATION & MAINTENANCE

A one-day program on practical, cost-effective solutions that work. The workshop will explain how to maximize yields and pump performance on existing wells and ensure correct design, construction, pump and pump control selection, and maintenance on new wells. New or existing, this program will enable groundwater users to reduce energy costs and prolong well life. Hear from experts about technologies and techniques to save money by maximizing efficiency and increasing performance. This program is for well owners, irrigators, consultants, engineers & designers, well operators, pump and well contractors. Just one tip on well & pump operation or problem-solving diagnosis could save thousands of dollars in operation costs and reduce replacement expense by extending the asset value of your wells & pumps.

Continuing Education
Approved for 6.75 Hours of Continuing Education by the California State Water Resources Control Board Drinking Water Operator Certification Program

Give a technological "kiss of life" to that underperforming well

Supply Systems – Well & Pump Workshop Program – Lakewood, CA

7:30 – 8:10 **REGISTRATION** (Coffee & donuts) **(Sign in for continuing education)**

8:10 - 8:20 **WORKSHOP INTRODUCTION - WELL & PUMP TECHNOLOGIES**
Andrew Stone, Executive Director, American Ground Water Trust, Concord, NH

8:20 – 9:05 **WELL HYDRAULICS – THE BASICS**
David Kill, P.E. Training Consultant, Xylem Goulds Water Technology, St. Paul, MN

- Definitions of the key hydraulic terms that are used in well efficiency calculations
- Explanations of the flow of water in aquifers towards wells
- Causes of well performance changes
- Flow dynamics through rock fractures or screens into well bores and into pump intakes

9:05 – 10:05 **EFFICIENT WELL DESIGN AND CONSTRUCTION PRINCIPLES: MAXIMIZING THE LIFE EXPECTANCY AND PRODUCTIVITY OF YOUR WELL**
Kevin McGillicuddy, Senior Hydrogeologist, Roscoe Moss Company, Los Angeles, CA

- How important is it to engage a hydrogeological expert before drilling a new well?
- Importance of investment in design, casing and screen materials, and construction techniques to maximize yield
- How to calculate performance in wells with constantly declining water levels
- Water well drilling, construction & well development methods to maximize yield
- The importance of monitoring and maintenance
- Case studies of improving well performance

10:05 – 10:20 BREAK

10:20 – 11:20 **WELL PERFORMANCE DECLINES: CAUSES AND CURES**
Neil Mansuy, VP, Subsurface Technologies, Kansas City, MO

- Chemical, microbiological and physical reasons for well problems
- Understanding typical “declining yield” problems
- Importance of well efficiency during declining water levels
- Case studies on cost-effective maintenance for high yield wells
- Preventive maintenance procedures

11:20 – 12:00 WELL PERFORMANCE SOLUTIONS
Norman Howard, Western US Sales Manager, Cotey Chemicals, Lubbock, TX

- Typical problems (mineral and biological blockage) that reduce well bore inflow
- The arsenal of chemicals available to enhance / restore well performance
- Matching the solution to the problem (How to decide on the “cocktail” to be used)
- The importance of a dual mechanical / chemical approach
- Successful well-yield restoration case-studies

12:00 – 1:00 LUNCH (Provided)

1:00 – 2:00 METHODS FOR IMPROVING WELL PERFORMANCE
Jim Bailey, National Well Services Director, Shannon & Wilson, Seattle, WA

- A practical approach to managing wells as an asset
- Why rehabilitate - Well inspection technology
- Key well performance indicators
- Prioritizing well condition factors
- How to decide on treatment options
- Theory behind particle movement during well development
- Simulations of well-aquifer / aquifer-well flow dynamics during rehabilitation

2:00 – 3:00 INTELLIGENT PUMP VARIABLE FREQUENCY DRIVES
Dan Peters, Applications Engineer, Yaskawa America, Inc., Cypress, CA

- Energy consumed by pumps
- Fixed speed with valve control vs. VFD
- AC drive basics (how VFD systems work)
- Water industry and agricultural applications of VFD controlled pumps
- Adding “intelligence” to pump system controls
- Case studies of cost advantages of using VFD to improve pump efficiency
- VFD controls to optimize management of multi-pump systems

3:00 – 3:15 BREAK

3:15 – 3:45 ECONOMIC SIGNIFICANCE OF FLEXIBLE DROP PIPE FOR WATER WELLS
Carlos Guerra, Territory Manager – Flexible Drop Pipe, Hose Solutions, Inc., Scottsdale, AZ

- Physical properties of flexible hose (strength and durability of hose)
- Hydraulic performance capabilities (elasticity, pressure thresholds)
- Pump installation and removal methods (connectors, reels, etc.)
- Cost savings for rapid “pump-in, pump-out” during maintenance or rehabilitation

3:45 – 4:30 SELECTION AND MAINTENANCE OF PUMPS FOR MAXIMIZING WELL YIELD/ COST BENEFITS
David Kill, P.E., Training Consultant, Xylem Goulds Water Technology, St. Paul, MN

- Causes of pump capacity changes.
- Pump efficiency principles, horsepower and bowl assembly selection criteria
- Pump efficiency testing, identifying the weak link in your system
- Merits of submersible vs. line-shaft for high yield wells - VFD technology
- Case studies of installation and O & M costs for different types of pump
- Pump replacement criteria, $ return on upgrading motor or bowls
- Information needed for deciding on pump specification for high-yield applications

4:30 ADJOURN and continuing education sign-out

WORKSHOP PRESENTERS: November 14, 2016 – Lakewood, CA

Jim Bailey, National Well Services Director, Shannon & Wilson, Seattle WA
Mr. Bailey has a MS degree in hydrogeology and is a registered professional geologist. He has over 20 years of experience in ground water supply work and hydrogeological investigations. Mr. Bailey was previously President of a well services company in the Pacific Northwest and has conducted a scientific study in Europe of proprietary German well rehabilitation technology. He has managed numerous water well rehabilitation projects using this technology in the Pacific Northwest, Western Canada, and the Southeast and gives frequent workshop presentations on well maintenance and rehabilitation

Carlos Guerra, Territory Manager, Hose Solutions, Inc., Scottsdale AZ
Carlos is a Military veteran who, while in the U.S. Army, worked as an aircraft structural repair tech. Carlos now with Hose Solutions Inc. is also lead technical assistant for installations involving Flexible Drop Pipe. He frequently works on site to tackle specific problems and provide assistance at installations. He also shares his experiences at conferences all over the US with several organizations including the NGWA, AGWT, and several state organizations.

Norman Howard, Western US Sales Manager, Cotey Chemicals, Lubbock, TX
Howard has over thirty years of experience in the water resource industry, specializing in well drilling aspects of groundwater development. His work has included drilling water production wells and installing pump systems for municipal, industrial, and agricultural applications. Previous employment has included Project Manager with Layne Christensen and Division Manager with Beylik Drilling. His work with Cotey Chemicals principally involves providing advice and guidance to well owners and operators about water well rehabilitation and the use of chemicals to maintain well performance. Cotey products are specially formulated to assist in new well development, routine maintenance to sustain maximum capacity and in the redevelopment and rehabilitation of older wells.

David Kill, P.E., Training Consultant, Xylem Goulds Water Technology, St. Paul MN
Mr. Kill is a Registered Professional Engineer and has a BS in Agricultural Engineering from the Univ. of Minnesota. He joined Johnson Screens in 1969 and became Regional Manager in 1974. In 1979 he joined the Fluid Systems Division UOP in the reverse osmosis water treatment business in San Diego, CA as Director of Marketing. He rejoined Johnson Screens in 1981 as Environmental Products Manager. In 1988, he founded Recovery Equipment Supply, a supplier of products for ground water monitoring and remediation. In 1996, he joined Goulds Pumps ITT and was promoted to Regional Commercial Business Manager in and Regional Market Development Manager in 2004. He was the 2005 NGWA McEllhiney Distinguished Lecturer and presented "Well Efficiency Is Not a Myth" to over 20 water well contractor conventions.

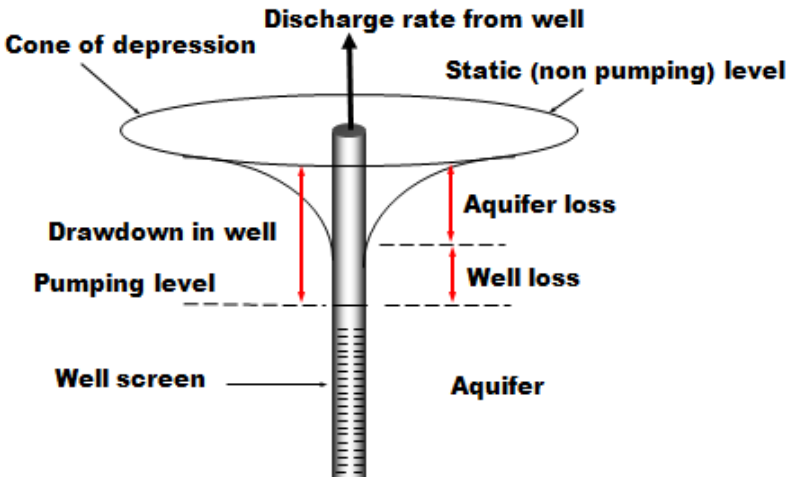
Neil Mansuy, Vice President of Technical Services, Subsurface Technologies, Kansas City, MO
Neil has 34 years of extensive, worldwide well problems and rehabilitation experience. He holds a M.Sc. degree in Ground Water microbiology specializing in iron-related bacteria and causes of well plugging. Neil worked nine years with Layne Geosciences Inc. as an aquifer and well rehabilitation specialist. His professional experience includes the assessment of well problems and recommending cost-effective solutions for thousands of wells across the U.S. and around the world. Neil has provided solutions to hundreds of wells, aquifers and water systems with "unsafe" bacterial results. He has the unique combination of extensive multidisciplinary understanding of well problems and the experience to recommend the most cost-effective solutions. Neil's workshop presentations cover all aspects of well problems and solutions related to lost capacity and water quality problems. Neil is the author of the book, "Water Well Rehabilitation," Lewis/CRC Press.

Kevin McGillicuddy, Senior Hydrogeologist, Roscoe Moss Company, Los Angeles CA
Kevin McGillicuddy is the Senior Hydrogeologist and Director of the Stormwater Treatment Division of Roscoe Moss Company. He joined the Roscoe Moss Company in 1996 and has worked as a technical liaison to municipal water agencies, groundwater consultants, and water well contractors. He has managed and participated in several educational workshops on water well design, testing and rehabilitation. Prior to joining Roscoe Moss Company, he worked as Director of Recharge Operations and as a Senior Hydrogeologist

for the Orange County Water District in Fountain Valley, CA. He holds a Bachelor or Science Degree in Geology from Boston College and Masters' of Science Degree in Geology from the University of Southern California. He is a Registered Geologist in the State of California.

Daniel Peters, Applications Engineer for Yaskawa America, Inc., Cyprus, CA
Dan Peters has over 20 years experience in applying variable frequency drives (VFD's) to a variety of commercial and industrial applications He has 11 years experience developing and or testing custom VFD software for a variety applications including water pumping, elevators, and electronic line shaft.
For the last eight years his work has focused on water pump specific applications for VFD's using custom application software environment. This includes extensive field testing on a variety of water pumping applications including: Vertical Turbines, Centrifugal pumps & Submersible pumps.

Andrew Stone, Executive Director, American Ground Water Trust, Concord, NH
Andrew Stone is a hydrogeology graduate from University College, London. 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. From 1990 to 2003 he taught an annual course on Groundwater Protection Policy at Antioch New England University. In recognition of his work in promoting ground water resource education in the US, he received the 1998 National Ground Water Association "Oliver Award" for outstanding contributions to the groundwater industry.



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~ Promote efficient and effective ground water management
~ Communicate the environmental and economic value of ground water
~ Showcase ground water science and technology solutions
~ Increase citizen, community and decision-maker awareness
~ Facilitate stakeholder participation in water resource decisions