**Workshop: Tempe (Phoenix), AZ - Thursday, November 5th 2015**

# GET MORE WATER AT LESS COST FROM YOUR EXISTING WELLS

## Design, operation, and maintenance of water wells in times of drought

**A one-day program for well owners and groundwater professionals on practical, cost-effective solutions that work. The program will explain how to maximize yields and pump performance on existing wells and ensure correct design, construction, pump selection and maintenance on new wells. New or existing, this program will enable groundwater users to reduce energy costs and prolong well life.**

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

**Workshop Venue:**
**American Legion Post #2, 2125 S Industrial Park Avenue, Tempe, AZ 85282**

**PROGRAM PRESENTED BY AMERICAN GROUND WATER TRUST** (a 501(c)(3) non-profit education organization)

**CONTINUING EDUCATION**
**Continuing Education approval requested for Water Operators and Well Contractors**
**[Check web-site www.agwt.org/events for status update]**

**Certificate of Attendance:** (Contact Hours: 6.75) will be provided to those attendees who sign-in and sign-out. These certificates may be used by attendees to obtain continuing education credit from professional organizations or licensing agencies. Attendance Certificates will be mailed after the event. (Sign-in, sign-out required)

**Hear from experts about technologies and techniques to save money and reduce carbon footprint. It is all about 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 you thousands of dollars in operation costs and reduce replacement expense by extending the asset value of your wells & pumps.**

**The American Ground Water Trust is a national, non-profit public education organization that has been providing ground water information, awareness and education since 1986.**

**The Trust's programs:**

- ☺ 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

### MORE WATER LESS COST - BACKGROUND

Inefficient wells cost millions of dollars in increased pumping costs. Well efficiency techniques and pump, and pump motor technology advances provide ways to reduce operation costs. This workshop program will show how major water users can save energy, manage resources efficiently and reduce infrastructure costs.

More than 2,000 utility managers, well contractors, water industry professionals, regulatory staff, well owners, water users and ground water specialists have attended this program in: AK, AR, AZ, BC, CA, CO, FL, IA, IL, IN, MA, MD, MI, MO, NC, NE, NH, NY, OH, OR, PA, TX, UT, VA, and WA.

### MORE WATER LESS COST – PROGRAM

**7:30 – 8:10** **REGISTRATION** (Coffee & donuts)

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

**8:30 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
- Flow dynamics through rock fractures or screens into well bores and into pump intakes

**9:15 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
- Well drilling to obtain maximum yield from aquifers
- Design basics for high-yield wells (screen selection, gravel-pack, etc.)
- Water well construction & well development methods
- The importance of monitoring and maintenance
- Well redevelopment / rehabilitation techniques
- Case studies of improving well performance

**10:15 ECONOMIC SIGNIFICANCE OF FLEXIBLE DROP PIPE FOR WATER WELLS**
Tanner Tryon, General Manager, 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

**10:45 BREAK**

**11:00 LIFE-CYCLE ECONOMIC ANALYSIS OF WATER WELLS – CONSIDERATIONS FOR DESIGN AND CONSTRUCTION (presentation developed from the 2012 NGWA McEllhiney lecture)**
Marvin F. Glotfelty, Principal Hydrogeologist, Clear Creek Associates, PLC, Scottsdale, AZ
- Elements of well design that impact the total well cost
- A life-cycle (75-year) economic analysis case study compares well screens of different steel types
- Economic analysis includes 70 municipal well costs, installed between 1993 and 2011
- Llife-cycle economic analysis shows that in some cases, millions of dollars can be saved with proper well design

**11:45 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

**12:45 LUNCH** (Provided)

**1:45 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

**2:30 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

**3:30 BREAK**

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

- How pumps work – evolution of the US pump market
- 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

**EVENT SPONSORS**

COTEY CHEMICAL CORP. Solving Water Well Production Problems Since 1949

GOULDS WATER TECHNOLOGY a xylem brand

YASKAWA

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

**Preferred Pump**

Layne

INDUSTRIAL DRILLING PRODUCTS BAROID HALLIBURTON

ROSCOE MOSS COMPANY

HoseSolutions Inc

Are you involved with pumping water from wells? Rural Water, irrigation operations, water utility supply, self-supplied industry, mine dewatering etc.? This workshop offers real, practical state-of-the-art information and advice that can make your operations more efficient and less expensive. Inefficient wells and pumps could be costing you tens of thousands of dollars. How would you know? Find out how to diagnose the problems and apply the most effective solutions.