

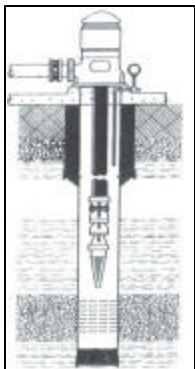
# **WATER WELL PERFORMANCE: THE ECONOMIC BASIS FOR WATER WELL OPERATION, REHABILITATION & MAINTENANCE DECISIONS**

**A one-day workshop on practical, cost-effective solutions  
to extend asset value by maximizing well performance**

**December 1st, 2009 ~ 8:15am-4:30pm**

**Holiday Inn St Paul East  
2201 Burns Avenue  
St. Paul, Minnesota 55119**

**Program presented by:  
AMERICAN GROUND WATER TRUST**



**Event sponsor: Layne Christensen**



## **CONTINUING EDUCATION**

**WATER OPERATORS**– 7.0 CEUs APPROVED THROUGH THE MN DOH, DRINKING WATER PROTECTION  
**WELL DRILLERS** - 6.0 CEUs APPROVED THROUGH THE MN DOH, WELL MGMT. SECTION, ENV. HEALTH DIVISION

## **MORE WATER LESS COST - BACKGROUND**

Inefficient wells cost millions of dollars in increased pumping costs and in unnecessary increments to the state's carbon footprint. This workshop program will show how major water users can save energy, manage resources efficiently and reduce infrastructure costs.

More than fourteen hundred utility managers, water industry professionals, regulatory staff, well owners, water users and ground water specialists have attended this program in: Baltimore MD; Little Rock AR; Des Moines IA (2); Nashua NH; Houston TX; (2) Lansing MI; Charlotte NC; Denver CO; Cincinnati OH; Wilsonville OR (2); Lakewood CA;(2) Seattle WA (2); Richmond VA, Long Island NY (2), Bucks County PA, Phoenix AZ, Langley BC, Orlando FL and Boynton Beach, FL.

## **MORE WATER LESS COST - WHAT IS IT ALL ABOUT?**

It is all about saving money (energy use and replacement) for well operators and owners and the communities they serve and,

Enhancing earning potential for companies involved in providing services that improve water well efficiency and reduce operation costs

The presentations combine the practical aspects of well rehabilitation and maintenance with the economic principles of asset management. The workshop will improve asset management assessment skills, address core questions involved in assessing well performance and provide clear guidance for well designers, contractors, owners, operators who make decisions related to well operation, maintenance, rehabilitation and replacement.

- ◆ What proportion of your overall water cost is related to well efficiency?
- ◆ Which asset management tools & concepts work best for decision-making?
- ◆ Do your well construction and design decisions include maintenance needs?
- ◆ What should be included in an RFP for well construction, maintenance or rehabilitation?
- ◆ What diagnostic indices determine the most effective rehabilitation techniques?
- ◆ Do you know if your supply wells have the potential to provide higher yield?

- ◆ Is declining yield related to the aquifer, the pump or the well?
- ◆ How do you calculate the cost-benefit of maintaining well efficiency?
- ◆ What is the basis for assessing the success of maintenance or rehabilitation?

## MORE WATER LESS COST - PROGRAM

7:30 – 8:15      **REGISTRATION, COFFEE, AND SIGN-IN FOR CEUs**

8:15 – 8:45      **ASSET MANAGEMENT PRINCIPLES & OVERVIEW OF THE WORKS HOP PROGRAM**

**Andrew Stone, Executive Director, American Ground Water Trust, Concord, NH**

- Water is free! What are the costs of accessing and delivering water?
- Assessment of well economics
- Value of an economic model template for decision-making
- What's new in the well rehabilitation decision-making process?

*Mr. Stone is a hydrogeology graduate from London University and has over thirty years of ground water experience in Africa and the U.S. as a professor and ground water consultant. He has first-hand experience of all aspects of well design and construction in a wide variety of geologic environments. As the director of the Trust's education programs he has participated in over 100 ground water related technical conference and workshop programs.*

8:45 - 9:45      **WELL & PUMP EFFICIENCY BASICS:**

**David Kill, Market Development Manager, ITT Industries, Shoreview, MN**

- A water well as an engineered hole in the ground
- What happens when water leaves the aquifer and enters the well
- Basic well hydraulics (bedrock wells and gravel-packed wells)
- How to assess the efficiency of pump operation
- How VFD in submersibles can reduce energy costs

*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 2002 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 McEllhine Distinguished Lecturer and presented "Well Efficiency Is Not a Myth" to over 20 water well contractor conventions.*

9:45 – 10:30      **METHODS FOR IMPROVING WELL PERFORMANCE**

**Jim Bailey, Principal Hydrologist, Kleinfelder, Bellevue, WA**

- A practical approach to managing wells as an asset
- Why rehabilitate - Well inspection technology
- Key well performance indicators
- Prioritizing well condition factors
- How do decide on treatment options

10:30– 10:45      **BREAK**

10:45 – 11:15      **RESEARCH ON THE DYNAMICS OF WATER FLOW AND ENERGY DISSIPATION IN WELLS**

- Theory behind particle movement during well development
- Simulations of well-aquifer / aquifer-well flow dynamics during rehabilitation

*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.*

11:15 – 11:45    **IMPORTANCE OF WELL DEVELOPMENT AT TIME OF WELL CONSTRUCTION**

**Andy Schumacher, Senior Field Sales Representative, Baroid-IDP, Belvidere, IL (invited)**

- Physical blockage caused by poor selection of drilling fluids
- Mitigating physical blockage by proper maintenance of drilling fluids
- Remediation methods for wells not adequately developed during construction

*Mr. Schumacher is a Senior Field Sales Rep. for Baroid-Industrial Drilling Products, covering the Upper Midwest. He received a BS in Geology from Beloit College, Beloit, WI in 1982. Andy has been involved in the drilling industry for 24 years, the last seven as a certified Mud Engineer for Baroid-IDP*

11:45 – 12:00    **ECONOMIC SIGNIFICANCE OF FLEXIBLE DROP PIPE WHEN WELLS NEED REHABILITATION**

**Nicolas Steverlynck, President, 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 logistics (time out and time in)

*Mr. Steverlynck is the President of Hose Solutions Inc., a flexible hose company based in Scottsdale, Arizona. His qualifications include a Diploma in Civil Engineering, and B.Comm. and MBA degrees from the University of Cape Town. His 17 years of professional experience include the manufacture, installation and operation of Boreline Flexible Drop Pipe in the USA, Asia, Australia, Africa and South America.*

12:00 – 12:45    **LUNCH (provided)**

12:45 – 1:15    **IMPORTANCE OF WELL SCREEN SELECTION IN HIGH YIELD WELLS:**

**Don Baron, District Manager, Johnson/Weatherford, Okemos, MI**

- Criteria for well screen selection and placement
- The role of screens in maximizing well performance and efficiency
- Pros and cons: well construction materials and well maintenance

*Mr. Baron has a MA in Geology from the Univ. of South Dakota (Vermillion, SD) and a BA Geology - Univ. of St. Thomas (St. Paul, MN). He worked for Johnson Screens from 1973 – 1985, 1988 – Present (17 Years - District Manager; 12 Years - Field Sales). He has sales responsibilities for the Midwest portion of the U. S. including the Dakotas to Michigan and Iowa to Indiana. His Canadian responsibilities include Manitoba to Prince Edward Island for Johnson Screens.*

1:15 – 2:00:    **WHY UTILITIES SHOULD CONSIDER ALTERNATIVE WELL DESIGNS**

**Henry Hunt, Senior Project Manager, Collector Wells International, Columbus, OH**

- Where to Consider Alternative Well Designs
- How Riverbank Filtration Can:
  - Improve Source Water Quality
  - Eliminate Nuisance Organisms (e.g. Zebra Mussels)
  - Reduce O&M Costs
  - Simplify Permitting
  - Increase Well Yields

*Mr. Hunt's expertise is in the inspection, evaluation, operation and maintenance of collector wells and in preparing feasibility studies for collector wells and other water supply alternatives. This involves economic evaluations for system comparisons and the development of innovative approaches to solving water supply problems. He has been involved with design, installation, maintenance and rehabilitation of collector wells, vertical wells, infiltration galleries, beach wells and surface water intakes in the U. S. and in South America for over 27 years. Mr. Hunt was a co-author of the recent publication: Riverbank Filtration: Improving Source-Water Quality.*

**2:00 – 2:45 WELL PERFORMANCE DECLINES: CAUSES AND CURES**

**David Hanson, President, Design Water Technologies, Shorewood, MN**

- Chemical, microbiological and physical reasons for well problems
- The arsenal of chemicals available to enhance/ restore well performance
- How do determine dosages of chemistry to assure success.
- The importance of development during rehab and the type of development based upon well design
- Successful well-yield restoration case-studies from the upper Midwest

*Mr. Hanson graduated from the Minnesota School of Business in 1972 with a degree in Management and Marketing. He worked with Johnson Screens for 14 years and left as Sales Manager of Well Products in 1988 to work for two years with the Christensen Mining Corp of Salt Lake City Utah as Marketing Manager of Groundwater Products. He was a principal author in Johnson Screen's second edition, reference book for the well industry, "Groundwater and Wells". He has given many technical seminars on Proper Chlorination, Well Efficiency, Test Hole Analysis, Geophysical Logging, Well Design and Well Development and was a presenter at AGWT Well Rehabilitation Workshops in WA, MI & NC.*

**2:45 – 3:00 BREAK**

**3:00 – 3:45 WELL MAINTENANCE AND REHABILITATION: A CONTRACTOR'S PERSPECTIVE**

**Roger Renner, President, EH Renner & Sons, Elk River, MN**

- Typical designs for high-yield wells in Minnesota
- Maintenance and rehabilitation needs and techniques for rock wells and for wells with screens and gravel packs
- The importance of client well performance records for assisting the contractor
- How routine maintenance scheduling can achieve optimum well performance and pump efficiency

*Mr. Renner graduated from St Cloud State University School of Business in 1971 with a BS Degree in Business Administration and a minor in accounting. He has 36 years of experience drilling and servicing high capacity Municipal Water supply wells and recovery wells with licenses in Minnesota, Wisconsin and South Dakota. He has given numerous technical seminars for the National Ground Water Association, AWWA, MN Rural Water Association, MN Water Well Association, Department of Agriculture, Department of Interior, and the Australian Industry Drilling Association. Mr. Renner also authored several technical articles for the Water Well Journal. Mr. Renner is a NGWA Certified Master Ground Water Contactor and is a past President of the National Ground Water Association.*

**3:45 – 4:30 WELL AND WELL FIELD ECONOMICS – A CONSULTANTS PERSPECTIVE**

**Kevin Powers and Dave Hume, Leggette, Brashears & Graham, Inc., St Paul, MN**

- Site selection
  - Optimizing yield and water quality
  - Minimize potential interaction with neighboring wells and surface waters
  - Regulatory approval and permitting
- Establishing a sound data collection and evaluation program
  - What information to record?
  - How to evaluate the information?
- Well rehabilitation efforts
  - Client/Engineer/Consultant/Contractor relationship
  - Routine rehabilitation methods
  - Engineered rehabilitation programs

*Mr. Powers Mr. Powers is a Sr. Vice President with Leggette, Brashears & Graham, Inc. a professional groundwater and environmental engineering consulting firm with offices nationwide. He began his career with LBG on the East Coast, but has practiced in Minnesota for the last 25 years. He is a licensed Professional Geologist and has conducted water supply and hydrogeological investigations across the US and in South America. Mr. Hume is a Senior Associate with Leggette, Brashears & Graham, Inc. He has a BA and MS in Geology and more than 20 years of groundwater consulting experience. He has conducted numerous groundwater resource investigations and well field development projects for public, private, and industrial supplies in unconsolidated and fractured aquifer systems.*

**4:30 WRAP-UP AND ADJOURN**

Further Questions and CEU sign-out

# REGISTRATION FORM

## Water Well Performance Program

Tuesday, December 1st, 2009, 8:15am – 4:30pm

**Holiday Inn St Paul East, 2201 Burns Avenue, St. Paul, Minnesota 55119**

Register on-line at: [www.agwt.org](http://www.agwt.org)

(Registration includes lunch and breaks)

Pre-Registration (General)	<input type="checkbox"/>	\$230.00
Pre-Registration (AGWT Members/Employees \$250+Level)	<input type="checkbox"/>	\$200.00
Pre-Registration (Full-time Student-ID Required at Registration)	<input type="checkbox"/>	\$100.00
Exhibit Table	<input type="checkbox"/>	\$200.00
CD of Presentations	Attendee <input type="checkbox"/>	\$15.00 / Non-Attendee <input type="checkbox"/> \$50.00
Total		\$ _____

(Walk-in Registration Day of Program: General \$260.00, AGWT \$230.00, Student \$130.00)

**PAYMENT:**    **Check**   *[Make checks payable to: American Ground Water Trust]*  
 **AMEX**    **Visa**    **MasterCard**    **PO#** \_\_\_\_\_

**Credit Card No.** \_\_\_\_\_ **Expiration** \_\_\_\_\_

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**Registrant Name** \_\_\_\_\_

**Professional Training** \_\_\_\_\_

**Company/ Organization** \_\_\_\_\_

**Address** \_\_\_\_\_

**City** \_\_\_\_\_ **State** \_\_\_\_\_ **Zip** \_\_\_\_\_

**Phone** \_\_\_\_\_ **E-Mail** \_\_\_\_\_

### CANCELLATION POLICY

- Cancellations received in the AGWT office by 5 pm (ET) 5 days prior to the start of the event will be granted a full refund less a \$25 processing fee.
- Cancellation four to two prior to the start of the event will receive a 50 % registration refund.
- Cancellations one day before the start of the event , or on the day of the event, are considered "No Shows." Refunds will not be made for "No Shows."  
**Substitutions gladly accepted.**
- The AGWT will not cancel a conference program because of bad weather conditions. Except that, as the result of an event cancellation resulting from, (but not limited to) circumstances such as a state mandatory evacuation or a fire at the program facility, the AGWT will reschedule the event and honor registrations as payment for the new event.