

# 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

Houston, Texas  
Monday, May 4th, 2009  
Optional technical tour to Baroid  
IDP facility, Tuesday, May 5th



Holiday Inn  
Houston International Airport  
15222 John F. Kennedy Blvd.  
Houston, TX 77032



Program presented by:  
**AMERICAN GROUND WATER TRUST**  
*Ground Water Education Programs Since 1986*



Continuing Education Credits approved for Well Contractors & Geologists  
Approval pending, but expected for Water Operators and Engineers  
Seven and a half contact hours for Day 1 and three contact hours for day 2

## MORE WATER LESS COST - BACKGROUND

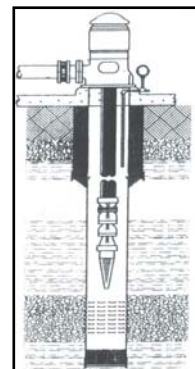
By 2060 the population of Texas is likely to double and be close to 46 million. Ground water accounts for 60% of the state's available fresh water. Right now, (2009) 95% of the state is experiencing drought. Inefficient wells cost millions of dollars in increased pumping costs and in unnecessary increments 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; Lansing MI; Charlotte NC; Denver CO; Cincinnati OH; Wilsonville OR (2); Lakewood CA;(2) Seattle WA (2); Richmond VA, Long Island NY, Bucks County PA, Phoenix AZ, Langley BC, Orlando FL and Boynton Beach, FL.

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

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, EXHIBITS AND SIGN-IN FOR CEUs**
- 8:15 – 8:30     **OVERVIEW OF THE WORKSHOP PROGRAM**  
**Andrew Stone, Executive Director, American Ground Water Trust, Concord, NH**  
- *Ground water as a local, regional and national economic & environmental resource*  
- *Water is free! What are the costs of accessing and delivering water?*  
- *How to solve the conundrum of identifying well, pump or aquifer problems*  
- *What's new in the well rehabilitation decision-making process?*
- 8:30 – 9:30     **DRILL NEW OR FIX? REHABILITATION: IS IT TIME? IS IT WORTH IT?**  
**Tony Morgan, Regional Manager, Layne Christensen Company, Fontana, CA**  
- *Well design & construction criteria to maximize efficiency*  
- *Data need for a scientifically based well maintenance schedule*  
- *Mechanical vs. chemical rehabilitation*  
- *Will any kind of preventive maintenance help?*  
- *How about well operation? Does this impact rehabilitation?*  
- *Frequency and cost considerations in well rehabilitation*
- 9:30– 10:15    **WELL ECONOMICS: ASSET MANAGEMENT PRINCIPLES AND IMPLEMENTATION STRATEGIES**  
**John Seifert, Principal, LBG-Guyton Associates, Houston, TX**  
- *How to compile and interpret costs of construction, operation & maintenance*  
- *Assessment of well economics in the context of water supply costs*  
- *Value of an economic model template in rehabilitation/ replacement decisions*
- 10:15– 10:30   **BREAK            Networking and Exhibits**
- 10:30 – 11:30   **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*  
- *Case studies of well yield declines attributable to encrustation*  
- *Diagnostic characteristics for rock wells, screened wells, horizontal wells and ASR wells*  
- *Prevention is more cost effective than cure:*  
    >*Case studies on effective well maintenance*  
    >*Preventive maintenance procedures*
- 11:30 – 12:15   **WELL PERFORMANCE SOLUTIONS**  
**Kevin McGinnis, President, Cotey Chemical Corporation, Lubbock, TX**  
- *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*  
- *Success well-yield restoration case-studies*
- 12:15 – 1:00    **LUNCH**
- 1:00 – 1:30     **FAST, EFFECTIVE SOLUTIONS TO WELL STIMULATION**  
**Andy Rowe, Executive Vice President, Downhole Fluidics, Inc, Midland, TX**  
- *Basic principles - Force = Mass x Acceleration*  
- *How oscillating pressure waves are created*  
- *Applications of the technology to water wells*  
- *How the equipment is operated on site (time and logistics)*  
- *Case studies of well yield restoration*

- 1:30 - 2:15      **SELECTION AND MAINTENANCE OF PUMPS FOR MAXIMIZING WELL YIELD/ COST BENEFITS**  
**Tom Karle, National Sales Manager - Engineered Products Division, Global Pumps & Equipment,**  
**Abernathy, TX**
- *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 (Installation and O & M costs)*
  - *Pump replacement criteria, \$ return on upgrading motor or bowls*
- 2:15 – 2:45      **WELL REHABILITATION SUCCESSES: CASE STUDIES IN TEXAS**  
**Randy Hagen, Layne Christensen Company, Houston, TX**
- *The Effects of Well Plugging*
  - *Types of Blockage*
  - *Well Cleaning Techniques*
  - *What it all means to Your Wallet*
- 2:45 – 3:00      **ECONOMIC SIGNIFICANCE OF FLEXIBLE DROP PIPE WHEN WELLS NEED REHABILITATION**  
**Tanner Tyron, 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)*
- 3:00 – 3:15      **BREAK                  Networking and Exhibits**
- 3:15 – 3:45      **WATER WELL REHABILITATION: METHODS AND APPLICATIONS**  
**Toby McClain, Senior Technical Specialist, Baroid IDP, Houston, TX**
- *How well rehabilitation chemicals work*
  - *How they should be used*
  - *The data needed in the decision making process to decide when they should be used*
  - *Case studies of yield restoration following treatment.*
- 3:45 – 4:30      **PREDICTIVE MAINTENANCE PROGRAMS FOR PRODUCTION WELLS**  
**Tom Morris, Hydrologist, ASR Systems, Las Vegas, NV**
- *Identification of the well facility processes that can be measured and evaluated*
  - *Definition of baseline performance and monitoring programs*
  - *How to manipulate data to evaluate aquifer, pump or wellbore issues*
  - *How to determine the costs of well performance losses*
- WELL PERFORMANCE TRACKING SOFTWARE** (all participants will receive the software CD)
- *Efficiency indices used to maximize cost savings by deciding when to repair, rehabilitate or replace*
  - *Explanation of the Well Field Maintenance Guide and Performance Tracking Software*
- 4:30 – 5:00      **THE “FEDERAL STIMULUS PACKAGE” and OVERALL WORKSHOP Q & A**  
**Andrew Stone, Executive Director, American Ground Water Trust, Concord, NH**
- *Well maintenance projects – funding - and the “stimulus package”*
  - *Permits, licensing, reporting and other “paperwork”*
  - *Roadblocks to adoption of maintenance programs*
  - *Emerging technologies for well maintenance and operation efficiency*
- 5:00 – 6:30      RECEPTION and CASH BAR**

## May 5<sup>th</sup> TECHNICAL TOUR TO BAROID (Industrial Drilling Products)

Technical tour to Baroid IDP Research and Development facility - Tuesday, May 5<sup>th</sup> from 8:30 to 11:30am.

[This tour is only available to people who registered for the Monday May 4<sup>th</sup> Workshop]

[Space is limited – pre-registration required – acceptance subject to company security clearance]

The Baroid IDP Facility is at 3000 N. Sam Houston Pkwy. E. - just a few hundred yards from the Holiday Inn. There will be an 8:00am shuttle service available from the hotel to Baroid and an 11:30 shuttle from Baroid to the airport or back to the Hotel. Parking at Baroid will be available for those using their own vehicles.

### Baroid IDP Staff, Technical Tour Leaders:

**Charles R. Landis, Technical Director**

**Ryan Collins, Chemist**

**Toby McClain, Senior Technical Specialist**

Baroid IDP has been an annual corporate supporter of the American Ground Water Trust's Education Programs for over 15 years. The AGWT is most grateful to Baroid for providing this "value-added" learning opportunity for participants at the Houston Water Well Performance Workshop

### The Technical Tour will include:

#### 1. Welcome & Introduction:

Baroid's past and present position and role in water well drilling industry research & development

#### 2. Analytical Capability:

An inspection of the various analytical techniques and equipment used for fundamental characterization of drilling fluids and the geology encountered in well construction

#### 3. Product Formulation and Application:

A review of the functionality of various drilling fluid additives and demonstrations on how they may be mixed and used, including selected videos of drill-site applications

#### 4. Geothermal Clay-Based Grouts:

A review of the techniques used to measure thermal conductivity, the thermal properties of common grouts, the behavior of thermal grouts during use and issues related to geothermal well construction

*Baroid Industrial Drilling Products, a Product Service Line of Halliburton, is a worldwide network of sales and service engineers, laboratory scientists, and support personnel dedicated to servicing all facets of the non-well drilling industries.*

*Since the 1950s, products and services have been expanded to include all types of drilling. Baroid Industrial Drilling Products now supplies a comprehensive line of drilling, grouting, plugging, abandonment, and well rehabilitation development products specifically engineered to optimize performance and end-user cost.*



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## CONTINUING EDUCATION CREDIT

An attendance certificate can be provided to all participants seeking to use this workshop for continuing education credit. Each attendee is responsible for determining the applicability of the program for educational credit through their specific certifying entity or agency.

**Continuing Education Credits confirmed for Well Contractors & Geologists. Approval pending for Water Operators and Engineers. Seven and a half contact hours for Day 1 and three contact hours for day 2**

## HOTEL INFORMATION

The Workshop will be held at the Holiday Inn Intercontinental Airport, 15222 John F. Kennedy Blvd. Houston, TX 77032. A block of rooms has been reserved for this event at a rate of \$139 per night. Individuals should call the Hotel Reservations Department at (281) 449-2311 and identify the group as American Ground Water Trust. The discount rate is only guaranteed up to April 13<sup>th</sup>. After that date additional reservation requests will be honored on a space and rate available basis. The hotel operates a free airport shuttle service.

# REGISTRATION

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

May 4th, 2009, Holiday Inn, Houston Airport/ 8:15am - 5:00pm  
Optional technical tour to Baroid IDP facility May 5<sup>th</sup> 8:30am – 11:30am  
(Only available for those registered for the May 4<sup>th</sup> program)

**Registration and payment also available on-line at [www.agwt.org](http://www.agwt.org) (conferences & workshops)**

Registration includes lunch, breaks and CD of well operation software.

**Registration options:** (on-line, fax, mail or phone pre-registration up to 4:00pm (eastern) Friday May 1<sup>st</sup>)

General .....	<input type="checkbox"/> \$230
Government employees (Federal, state, county, local) .....	<input type="checkbox"/> \$200
Employees of AGWT Members) (\$250+ Level) .....	<input type="checkbox"/> \$180
Full-Time Student) (ID Required at Registration) .....	<input type="checkbox"/> \$110
CD of Presentations (pdf versions of PowerPoint presentations – mailed post-event)	<input type="checkbox"/> \$15
Exhibit Table (Registration <u>not</u> included; You must also register.) .....	<input type="checkbox"/> \$250
Technical tour (May 5 <sup>th</sup> ) (Baroid IDP facility, 3000 N. Sam Houston Pkwy. E ).....	<input type="checkbox"/> \$50

TOTAL \$ \_\_\_\_\_

Walk-in registration cost (General \$270, Government \$240, AGWT Member \$210, Student \$130)

CHECK (Payable to: American Ground Water Trust)  VISA/MC  AMEX  PO

Card # (or PO#) \_\_\_\_\_ Exp. Date \_\_\_\_\_

Cardholder Name \_\_\_\_\_ Cardholder E-mail \_\_\_\_\_  
(Payment confirmation will be sent via email)

Name for Registration \_\_\_\_\_ Registrant E-mail \_\_\_\_\_  
(Registration confirmation will be sent via email)

Title \_\_\_\_\_ Phone \_\_\_\_\_

Company \_\_\_\_\_ Fax \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

\* Mail to: American Ground Water Trust, 50 Pleasant Street, STE 2, Concord, NH 03301-4073

Phone: (603) 228-5444

Return by fax: (603) 228-6557

Register securely online: [www.agwt.org/workshops.htm](http://www.agwt.org/workshops.htm)